TM 5-4120-287-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT
AND GENERAL SUPPORT
AND DEPOT MAINTENANCE MANUAL

AIR CONDITIONER, BASE-MOUNTED, SELF-CONTAINED LIGHTWEIGHT, AIR-COOLED, 38,000 BTU/HR COOLING AND 35,000 BTU/HR HEATING CAPACITY; FAIRCHILD STRATOS MODEL VEA4-3A, PN 107201 (FSN 4120-926-4280)

This copy is a reprint which includes current pages from Changes 2 through 5.

HEADQUARTERS, DEPARTMENT OF THE ARMY

JULY 1968

SAFETY PRECAUTIONS

The operating voltage of this air conditioner is dangerous to persons coming in conta with any part of the electrical system. Severe, possibly fatal, shock may result. Disconnect t power source before performing any maintenance or inspection, other than operating tests the air conditioner.

The refrigerant used in the air conditioner (refrigerant-12) is injurous to the eyes a skin. Wear goggles and gloves to avoid injury. If leaks occur in the refrigerant system, imn diately and thoroughly ventilate the area.

Purge the system refrigerant charge completely prior to opening the system for main nance and repair.

Refrigerant-12 decomposes in the presence of fire, forming a toxic gas. Do not release 1 refrigerant when a torch or other flame-producing apparatus is being used.

Do not connect the master power cable unless the master circuit breaker is in the OFF sition.

Avoid breathing smoke when using the monobromotrifluoromethane-type fire extinguish

CHANGE NO. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 14 April 1988

Operator, Organizational, Direct Support,
General Support and Depot Maintenance Manual

AIR CONDITIONER, BASE MOUNTED, SELF-CONTAINED, LIGHTWEIGHT, AIR COOLED, 38,000 BTU/HR COOLING AND 35,000 BTU/HR HEATING CAPACITY (FAIRCHILD-STRATOS MODEL VEA4-3A, P/N 107201)
NSN 4120-00-926-4280

TM 5-4120-287-15, 15 July 1968, is changed as follows:

Page 1-17, figure 1-9, is superseded as follows:

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator, Unit, Direct Support and General Support Maintenance Requirements for Air Conditioner, Base Mounted, Air Cooled, Self-Contained, 38,000 BTU Cool/35,000 BTU Heat (VEA4-3A).

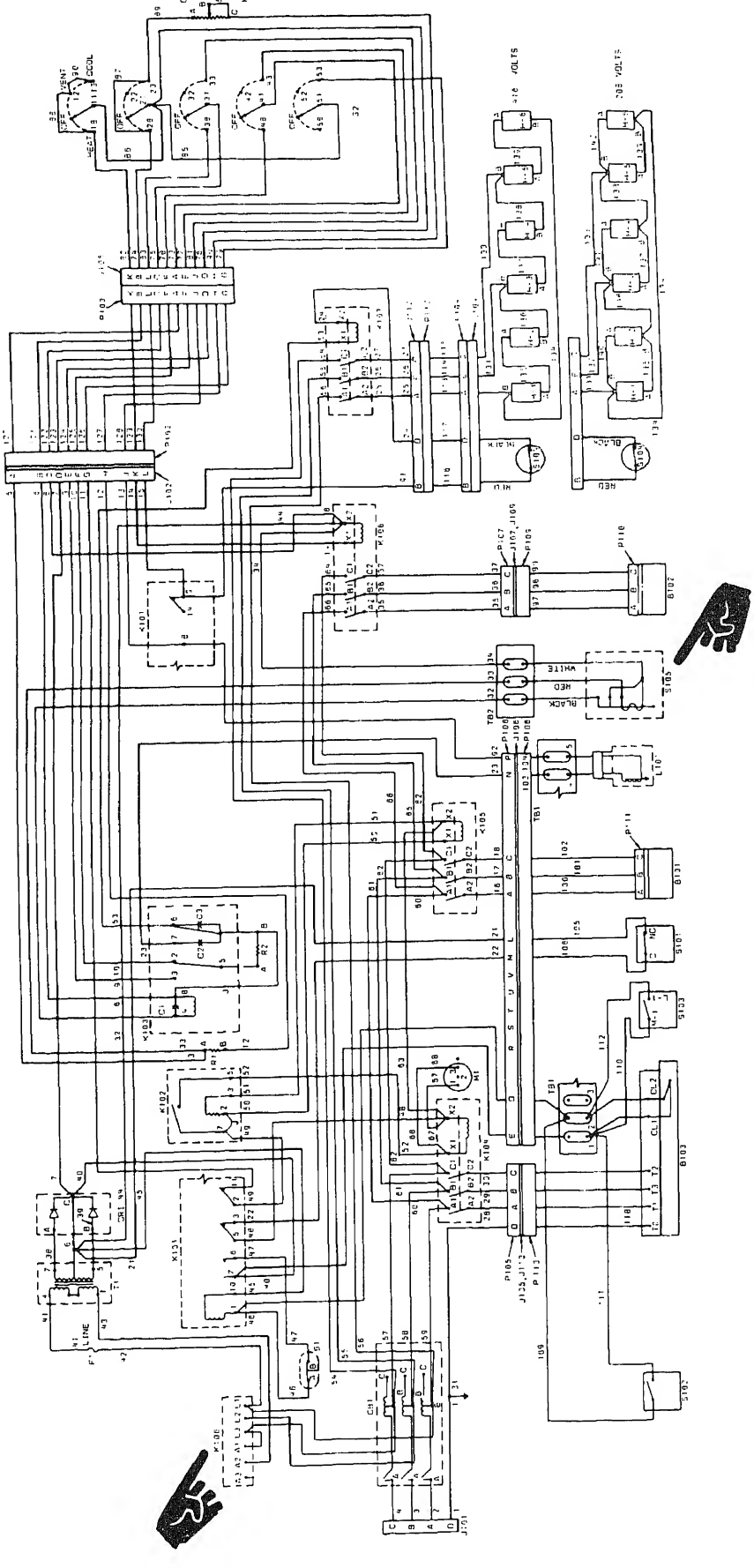

Figure 1–9. Air conditioner electrical system wiring diagram.

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *3 July 1978*

**Operator, Organizational, Direct Support,
General Support and Depot Maintenance Manual**

**AIR CONDITIONER, BASE MOUNTED, SELF-CONTAINED, LIGHTWEIGHT, AIR COOLED, 38,000 BTU/HR COOLING AND 35,000 BTU/HR HEATING CAPACITY (FAIRCHILD-STRATOS MODEL VEA4-3A, P/N 107201)
NSN 4120-00-926-4280**

TM 5-4120-287-15, 15 July 1968, is changed as follows:

Page 1-1. Paragraph 1-1d, lines 6 thru 9, change to read: "forward direct to Commander, U. S. Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MTPS,4300 Goodfellow Boulevard, St. Louis, Missouri 63120.

Page 1-11. Paragraph 1-4b. (18), line 4, change model number FR-3S-ND-28 to FR3SNO28.

Page 1-17. Figure 1-9, make the following changes:

(1) T1 pin 6 is shown connected to pin C of CR1 (top, left). Delete this connection.

(2) K108 does not have a wire on pin A3 as shown. The wire shown as pin A3 should go to pin A1.

(3) Contacts between overloads OL1 and OL2 are incorrectly shown in the normally closed position, mark these contacts normally open (NO).

Page 6-1. Table 6-1, make the following changes:

(1) The continuity check between pins A-E should indicate continuity (C) when the switch is set to the "COOL" position.

(2) Add continuity check for pins G-D. Continuity should be present in the "COOL" position and open (O) in the other positions.

Page 6-5. Paragraph 6-6c, after last sentence add:

A replacement pressure switch may be supplied without capillary tubes. This type pressure switch would contain 1/4 inch male flare connections and can be installed by utilizing existing capillary tubes from the original pressure switch as follows:

(1) Discharge the refrigerant system (para 7-7).

(2) Cut capillary tubes close to base of original pressure switch leaving other ends brazed in place on the respective high and low refrigerant line tee fittings.

(3) Braze a short piece of 1/4 inch O. D. copper tubing, approximately 2 inches long, to cut end of each capillary tube.

(4) Install 1/4 inch flare nut on each capillary tube and flare ends of copper tubing added in step (3) above. The flare nuts and capillary tubes will remain permanently installed on the refrigerant lines.

(5) Connect capillary tubes to their respective high and low outlet on new pressure switch.

(6) Refer to Chapter 7, leak test, evacuate, add compressor lubricating oil, and charge refrigerant system.

y Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

fficial:

J. C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

istribution:
To be distributed in accordance with DA Form 12-25C, Operator maintenance
equirements for Air Conditioners, 38,000 BTU.

CHANGE
NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *15 March 1975*

Operator, Organizational, Direct Support, General Support and Depot Maintenance Manual AIR CONDITIONER, BASE MOUNTED, SELF-CONTAINED, LIGHTWEIGHT, AIR COOLED, 38,000 BTU/HR COOLING AND 35,000 BTU/HR HEATING CAPACITY (FAIRCHILD-STRATOS MODEL VEA4-3A, P/N 107201) NSN 4120-00-926-4280

TM 5-4120-287-15, 15 July 1968, is changed as follows:

Title is changed as shown above.

Page 2 of cover. Add the following warning to the list of safety precautions:

WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety and Health or the US Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate. Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this type of environment.

Page 7-6, paragraph 7-14*a*. Add the following warning.

WARNING

The burning of polyurethane foams is dangerous. Due to the chemical composition of a polyurethane foam, toxic fumes are released when it is burned or heated. If it is burned or heated indoors, such as during a welding operation in its proximity, precautions should be taken to adequately ventilate the area. An exhaust system equivalent to that of a paint spray booth should be used. Air supplied respirators, approved by the National Institute for Occupational Safety and Health or the US Bureau of Mines, should be used for all welding in confined spaces and when ventilation is inadequate. Individuals who have chronic or recurrent respiratory conditions, including allergies and asthma, should not be employed in this type of environment.

Order of the Secretary of the Army:

FRED C. WEYAND
General, United States Army
Chief of Staff

icial:

/ERNE L. BOWERS
Major General, United States Army
The Adjutant General

stribution:
To be distributed in accordance with DA Form 12-25C (qty rqr block No. 566), organizational
aintenance requirements for Environmental Equipment, Air Conditioners, 38,000 BTU.

TM 5-4120-287-15
*C 2

Change
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D C, *19 April 1973*

Operator, Organizational, Direct Support, General Support, and Depot Maintenance Manual AIR CONDITIONER, BASE-MOUNTED, SELF-CONTAINED, LIGHTWEIGHT, AIR-COOLED, 38,000 BTU/HR COOLING AND 35,000 BTU/HR HEATING CAPACITY; (FAIRCHILD-STRATOS MODEL VEA4-3A, PN107201) FSN 4120-926-4280

TM 5-4120-287-15, 15 July 1968, is changed as follows:

Page 1-1. Paragraph 1-1 is superseded as follows:

1-1. Scope

a. This manual is for your use in operating and maintaining the air conditioner.

b. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to: Commander, US Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished directly to you. Paragraph 1-2 is superseded as follows:

1-2. Maintenance Forms and Records

Maintenance forms and records that you are required to use are explained in TM 38-750.

Page 1-17, figure 1-9. In the bottom center of the illustration, "S101" is changed to read "S105".

Page 3-2, paragraph 3-6. In line 3, "figure 3-1" is changed to read "table 3-1".

Paragraph 3-7b. In line 3, "figure 3-2" is changed to read "table 3-2".

Table 3-1 is added as follows:

Table 3-1. Operator/Crew Preventive Maintenance Checks and Services W—Weekly

Interval and Sequence No. D	W	Item to be Inspected Procedure
1		REFRIGERANT LIQUID SIGHT GLASS Inspect refrigerant condition at sight glass for condition of refrigerant in system while unit is operating with air conditioning switch in cool, and temperature control set in MAXIMUM COOL position. Milky flow indicates moisture, bubbles indicate low charge. Report either condition to organizational maintenance.
2		FILTER CLEAN INDICATORS Inspect filter clean indicators while air conditioning is operating. Clean or replace filter when indicator ball rises to SERVICE position (paras 3-11, 3-12).
3		FUSE INDICATOR Indicator will glow if fuse is defective. Replace defective fuse (para 3-9).
4		CONTROLS AND INSTRUMENTS Inspect controls and instruments for loose mounting and any damage that would affect operation of controls.

**This change supersedes C1, 17 May 1972.*

Q—Quarterly

Sequence Number	Item To Be Inspected Procedure	Work Time (M/H)
1	EVAPORATOR BLOWER WHEEL Inspect blower wheel for accumulation of dirt or lint on wheel blades. Clean wheel with brush.	
2	EVAPORATOR ASSEMBLY AND MIST ELIMINATOR Inspect evaporator coil and mist eliminator for accumulation of dirt clogging air flow. Clean evaporator coils and fins with soft brush and compressed air Wash mist eliminator with water.	
3	CONDENSER ASSEMBLY Inspect condenser coil and fins for accumulation of dirt and lint. Clean condenser coils and fins with soft brush and compressed air.	
4	CONTROLS AND INSTRUMENTS Inspect controls and instruments on electrical tray panel and remote control box for operation.	

Pages 3-3 and 3-4. Figure 3-1 is rescinded.

Pages 3-5 and 3-6. Figure 3-2 is rescinded.

Page 6-1. In table 6-1, line AE, "0-0-0-0" is changed to read "0-0-0-C".

Page 6-5, paragraph 6-6e (1). In line 3, "TB 1" is changed to read "TB 2".

Page B-1. Appendix B is superseded as follows:

APPENDIX B
BASIC ISSUE ITEM LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

B-1. Scope

This appendix lists basic issue items, items troop installed or authorized which accompany the air conditioner and are required by the crew/operator for operation, installation, or operator's maintenance.

B-2. General

This basic issue items, items troop installed or authorized list is divided into the following sections:

a. Basic Issue Items List—Section II. Not applicable.

b. Items Troop Installed or Authorized List—Section III. A list in alphabetical sequence of items which, at the discretion of the unit commander, may accompany the end item, but are NOT subject to be turned in with the end item.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section III.

a. Source, Maintenance, and Recoverability Code(s) (SMR): Not applicable.

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of Measure (U/M). A 2-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity Authorized (Items Troop Installed or Authorized Only). This column indicates the quantity of the item authorized to be used with the equipment.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR Code	(2) Federal stock Number	(3) Description Ref No. & Mfr code	Usable on code	(4) Unit of meas	(5) Qty auth
	7520-559-9618	CASE, MANUAL		EA	1
	4130-860-0042	OIL FILTER: Water Soluble		EA	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25C (qty rqr block No. 566) Organizational Maintenance requirements for Air Conditioners: 38,000 BTU.

TECHNICAL MANUAL
No. 5-4120-287-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *15 July 1968*

OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

AIR CONDITIONER, BASE-MOUNTED, SELF-CONTAINED LIGHTWEIGHT, AIR-COOLED, 38,000 BTU/HR COOLING AND 35,000 BTU/HR HEATING CAPACITY; FAIRCHILD STRATOS MODEL VEA4-3A, PN 107201 (FSN 4120-926-4280)

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1–1. Scope

a. These instructions are published for use by personnel to whom the air conditioner, base-mounted, self-contained, lightweight, air cooled, 38,000 BTU/hr (British Thermal Units per hour) cooling and 35,000 BTU/hr heating capacity, Model VEA4–3A (manufactured by Stratos Division, Fairchild Hiller Corporation, Bay Shore, New York) is issued. The equipment will hereafter be referred to as the air conditioner. Chapters 1 through 3 provide information on operation, preventive maintenance services, and organizational maintenance of equipment, accessories, components, and attachments. Chapter 4 provides information for direct and general support and depot maintenance. Also included are descriptions of main units and their functions in relationship to other components.

b. Appendix A contains a list of publications applicable to this manual. Appendix B contains the list of basic issue items authorized the operator of this equipment and the list of maintenance and operating supplies required for initial operation. Appendix C contains the maintenance allocation chart. Organizational, direct and general support and depot maintenance repair parts and special tools are listed in TM 5–4120–287–25P.

c. Numbers in parentheses following nomenclature callouts on illustrations indicate quantity; numbers preceding nomenclature callouts indicate preferred sequence.

d. Report of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U.S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

1–2. Record and Report Forms

a. DA Form 2258 (Depreservation Guide for Vehicles and Equipment).

b. For other record and report forms applicable to operator, crew, organizational maintenance, direct and general support and depot maintenance, refer to TM 38–750.

Note. Applicable forms, excluding Standard Form 46 (United States Government Motor Vehicles Operator's Identification Card) which is carried by the operator, shall be kept in a canvas bag mounted on equipment.

Section II. DESCRIPTION AND TABULATED DATA

1–3. Description

a. General. The air conditioning unit (figs. 1–1 and 1–2) is a lightweight, air transportable, vapor cycle air conditioning package specifically designed to provide conditioned air for guided missile ground support shelters. This unit may also be utilized in other vehicles having similar personnel and equipment cooling requirements. After initial installation on a trailer or in a shelter, the unit is capable of an air cooling load capacity of 38,000 BTU/hr utilizing a 416-volt, 6-pole motor, 7700 rpm (revolutions per minute), 8-hp (horsepower) motor compressor. The unit has

a heating capacity of 35,000 BTU/hr (10.5 kw (kilowatts)). The air conditioning unit is contained in a single enclosure of compact sturdy construction built to rigid military specifications and standards. The enclosure is subdivided into a condenser section and evaporator section. The condenser section contains the compressor, condenser fan, and high pressure refrigerant controls. The evaporator section contains the evaporator, evaporator fan, expansion valve, heaters, electrical controls, and temperature controls. Functionally, the air conditioning unit consists of a cooling subsystem and a heating subsystem regulated by either automatic or manual controls from a remote control box.

b. Electrical Tray Assembly. The electrical tray assembly (fig. 1-3) contains the electrical power controls and relays. The front panel of the electrical tray assembly contains the circuit breaker, the system reset push button, the hourmeter, the control circuit fuse, the main power connector, and the remote control box assembly connector. Mounted within the electrical tray assembly are the motor control relays, the temperature control relays, the transformer, the phase sequence relay, and the rectifier. The 28-vdc (volts direct current) power required for the operation of the relays is obtained from the transformer and the rectifier.

c. Remote Control Box Assembly. The remote control box assembly (fig. 1-1) contains the operating controls for the air conditioning unit. Mounted on the front panel is a four-position (HEAT, OFF, VENT, COOL) five-deck switch and a temperature control variable resistor (minimum setting COOL; maximum setting HEAT). The rheostat dial is continuously variable between the COOL and WARM positions, which corresponds to a return air temperature range of 60F to 90F.

d. Motor-compressor. The motor-compressor (fig. 1-4) consists of positive-displacement compressor which is directly driven by an integral 8-hp, 416-volt, 400-cycle, 3-phase, 4-wire induction motor with a designed speed of 7700 rpm. The compressor draws low pressure refrigerant vapor from the evaporator and compresses it to a high pressure, high temperature refrigerant vapor. The motor-compressor runs continuously when the air conditioner is operating in the COOL mode.

e. Thermostat. The thermostat (fig. 1-3) is located in the evaporator compartment. The thermostat senses the temperature of the air entering the evaporator and provides control signals to maintain desired temperatures.

f. High-low Pressure Cut-out Switch. The high-low pressure cut-out switch (fig. 1-4) is a dual single pole, single-throw switch which protects the cooling system from excessive compressor discharge pressure and low compressor inlet pressure. The high pressure side of the switch is connected into the compressor discharge line; the low pressure side into the compressor inlet line. The switch has a rating of 2 amperes at 28 vdc. The high pressure side is set to close the switch (energizing the trip relay, which removes power from the compressor) when the pressure in the compressor discharge line increases to 260 to 265 psig (pounds per square inch gage). The switch will automatically reset when the discharge line pressure decreases to 200 to 220 psig. The low pressure side is set to close the switch when the pressure in the compressor inlet line decreases to 20 to 21 psig. The switch will automatically reset when the inlet line pressure increases to 30 to 40 psig. The system trip relay is reset by pressing the system RESET switch (fig. 1-3).

g. Condenser Fan. The condenser fan assembly (fig. 1-5) provides cooling air for the condenser. As supplied, it is complete with its own bearings and seals and is permanently lubricated. The fan is a high speed (5800 rpm) continuous duty, vane-axial type with a self-contained motor for use on 416-volt, 3-phase, 400-cycle, 4-wire power. The condenser fan is rated at 4120 SCFM (Standard Cubic Feet/Minute). The fan motor is constructed with an internal automatic reset thermal and overcurrent protector.

Note. The condenser fan discharge door must be open when unit is operating in cooling cycle. A Microswitch, activated by the door, prevents operation of compressor motor and condenser fan motor if door is closed.

h. Condenser-subcooler Assembly.

(1) *Condenser subassembly.* The condenser (fig. 1-4) is a crossflow-type heat exchanger of copper tube and aluminum fin construction. The condenser rejects the heat absorbed by the refrigerant in the evaporator and the heat of compression added by the compressor; thereby transforming the refrigerant vapor into a liquid. The liquid refrigerant is then passed from the condenser outlet to the receiver inlet.

(2) *Subcooler subassembly.* The subcooler (fig. 1-4) is integral with the condenser, and is cooled by air drawn across it by the condenser fan. The subcooler, located in the line between the receiver and the filter drier, lowers the refrigerant temperature approximately 8°F; and thereby prevents flashback (vaporization) of the liquid refrigerant before it passes through the expansion valve.

i. Low Ambient Switch. The low ambient temperature switch (fig. 6-2) located in the condenser air inlet stream closes when the ambient air temperature falls below 40°F; causing the cooling cycle to cease by de-energizing the motor compressor and condenser fan motor. The evaporator fan motor continues to operate, recirculating the shelter air and/or drawing in fresh air. When ambient temperature rises above 50F, the low ambient temperature switch opens; then upon pressing the system reset switch, the cooling cycle resumes.

j. Receiver. The receiver, located between the condenser and the subcooler (fig. 1-4), stores condensed (liquified) refrigerant. This stored liquid refrigerant acts as a seal between the partial vapor-liquid state in the condenser and the liquid supply to the evaporator expansion valve.

k. Hot Gas Bypass Valve. The hot gas bypass valve (fig. 1-4) regulates the compressor inlet pressure. It consists of a housing with a replaceable power unit. The power unit contains a spring and diaphragm which actuate the valve mechanism. Three tube connections on the housing accommodate the inlet and outlet lines and the pressure equalizing line which is connected to the compressor inlet line. The valve maintains a minimum compressor inlet pressure of 28 psig during light-load operation; thus preventing evaporator air side freeze-up. This function is accomplished by passing compressor discharge gas into the compressor inlet line.

l. Filter-drier. The filter-drier (fig. 1-4) consists of a sheet metal housing with 1/2-inch flared inlet and outlet connections. The unit contains a conical filter screen, the base of which is mounted to a fiber glass pad at the outlet end of the housing. Within the housing, both inside and outside the cone screen, is the drying agent (desiccant), which is cast in the form of 1/8-inch balls of activated aluminum. (The filter-drier is installed directly in the liquid-refrigerant line between the subcooler subassembly and the refrigerant solenoid valve.) It is used to remove entrained moisture, sludge, dirt, and other foreign particles from the liquid refrigerant. The filter-drier is a throwaway unit which must be replaced when the refrigerant charge is replaced and/or when the system has been subjected to extensive maintenance or servicing.

m. Solenoid Valve. The solenoid valve (fig. 1-4) is an electrically operated, thermostatically controlled shutoff valve located in the liquid refrigerant line between the filter-drier and the expansion valve. When the solenoid valve is closed, refrigerant flow to the expansion valve is stopped and compressor discharge gas is bypassed to the compressor suction inlet) line through the hot gas bypass valve. When the air conditioner is operating in the cooling mode the compressor operates continuously. Air temperature regulation is accomplished by the thermostatically controlled opening and closing of the solenoid valve.

n. Refrigerant Liquid Sight Indicator. The refrigerant liquid sight indicator (fig. 1-2), installed upstream of the expansion valve, can be viewed through a port in the air conditioner rear wall. The indicator consists of a metal body with 1/2-inch inlet and outlet connections; and a glass viewing window, permitting visual indication of adequate liquid refrigerant flow to the thermostatic expansion valve. The system moisture content indicator,

a heating capacity of 35,000 BTU/hr (10.5 kw (kilowatts)). The air conditioning unit is contained in a single enclosure of compact sturdy construction built to rigid military specifications and standards. The enclosure is subdivided into a condenser section and evaporator section. The condenser section contains the compressor, condenser fan, and high pressure refrigerant controls. The evaporator section contains the evaporator, evaporator fan, expansion valve, heaters, electrical controls, and temperature controls. Functionally, the air conditioning unit consists of a cooling subsystem and a heating subsystem regulated by either automatic or manual controls from a remote control box.

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Note. The condenser fan discharge door must be open when unit is operating in cooling cycle. A Microswitch, activated by the door, prevents operation of compressor motor and condenser fan motor if door is closed.

h. Condenser-subcooler Assembly.

(1) *Condenser subassembly.* The condenser (fig. 1–4) is a crossflow-type heat exchanger of copper tube and aluminum fin construction. The condenser rejects the heat absorbed by the refrigerant in the evaporator and the heat of compression added by the compressor; thereby transforming the refrigerant vapor into a liquid. The liquid refrigerant is then passed from the condenser outlet to the receiver inlet.

(2) *Subcooler subassembly.* The subcooler (fig. 1–4) is integral with the condenser, and is cooled by air drawn across it by the condenser fan. The subcooler, located in the line between the receiver and the filter drier, lowers the refrigerant temperature approximately 8°F; and thereby prevents flashback (vaporization) of the liquid refrigerant before it passes through the expansion valve.

i. Low Ambient Switch. The low ambient temperature switch (fig. 6–2) located in the condenser air inlet stream closes when the ambient air temperature falls below 40°F; causing the cooling cycle to cease by de-energizing the motor compressor and condenser fan motor. The evaporator fan motor continues to operate, recirculating the shelter air and/or drawing in fresh air. When ambient temperature rises above 50F, the low ambient temperature switch opens; then upon pressing the system reset switch, the cooling cycle resumes.

j. Receiver. The receiver, located between the condenser and the subcooler (fig. 1–4), stores condensed (liquified) refrigerant. This stored liquid refrigerant acts as a seal between the partial vapor-liquid state in the condenser and the liquid supply to the evaporator expansion valve.

k. Hot Gas Bypass Valve. The hot gas bypass valve (fig. 1–4) regulates the compressor inlet pressure. It consists of a housing with a replaceable power unit. The power unit contains a spring and diaphragm which actuate the valve mechanism. Three tube connections on the housing accommodate the inlet and outlet lines and the pressure equalizing line which is connected to the compressor inlet line. The valve maintains a minimum compressor inlet pressure of 28 psig during light-load operation; thus preventing evaporator air side freeze-up. This function is accomplished by passing compressor discharge gas into the compressor inlet line.

l. Filter-drier. The filter-drier (fig. 1–4) consists of a sheet metal housing with 1/2-inch flared inlet and outlet connections. The unit contains a conical filter screen, the base of which is mounted to a fiber glass pad at the outlet end of the housing. Within the housing, both inside and outside the cone screen, is the drying agent (desiccant), which is cast in the form of 1/8-inch balls of activated aluminum. (The filter-drier is installed directly in the liquid-refrigerant line between the subcooler subassembly and the refrigerant solenoid valve.) It is used to remove entrained moisture, sludge, dirt, and other foreign particles from the liquid refrigerant. The filter-drier is a throwaway unit which must be replaced when the refrigerant charge is replaced and/or when the system has been subjected to extensive maintenance or servicing.

m. Solenoid Valve. The solenoid valve (fig. 1–4) is an electrically operated, thermostatically controlled shutoff valve located in the liquid refrigerant line between the filter-drier and the expansion valve. When the solenoid valve is closed, refrigerant flow to the expansion valve is stopped and compressor discharge gas is bypassed to the compressor suction inlet) line through the hot gas bypass valve. When the air conditioner is operating in the cooling mode the compressor operates continuously. Air temperature regulation is accomplished by the thermostatically controlled opening and closing of the solenoid valve.

n. Refrigerant Liquid Sight Indicator. The refrigerant liquid sight indicator (fig. 1–2), installed upstream of the expansion valve, can be viewed through a port in the air conditioner rear wall. The indicator consists of a metal body with 1/2-inch inlet and outlet connections; and a glass viewing window, permitting visual indication of adequate liquid refrigerant flow to the thermostatic expansion valve. The system moisture content indicator,

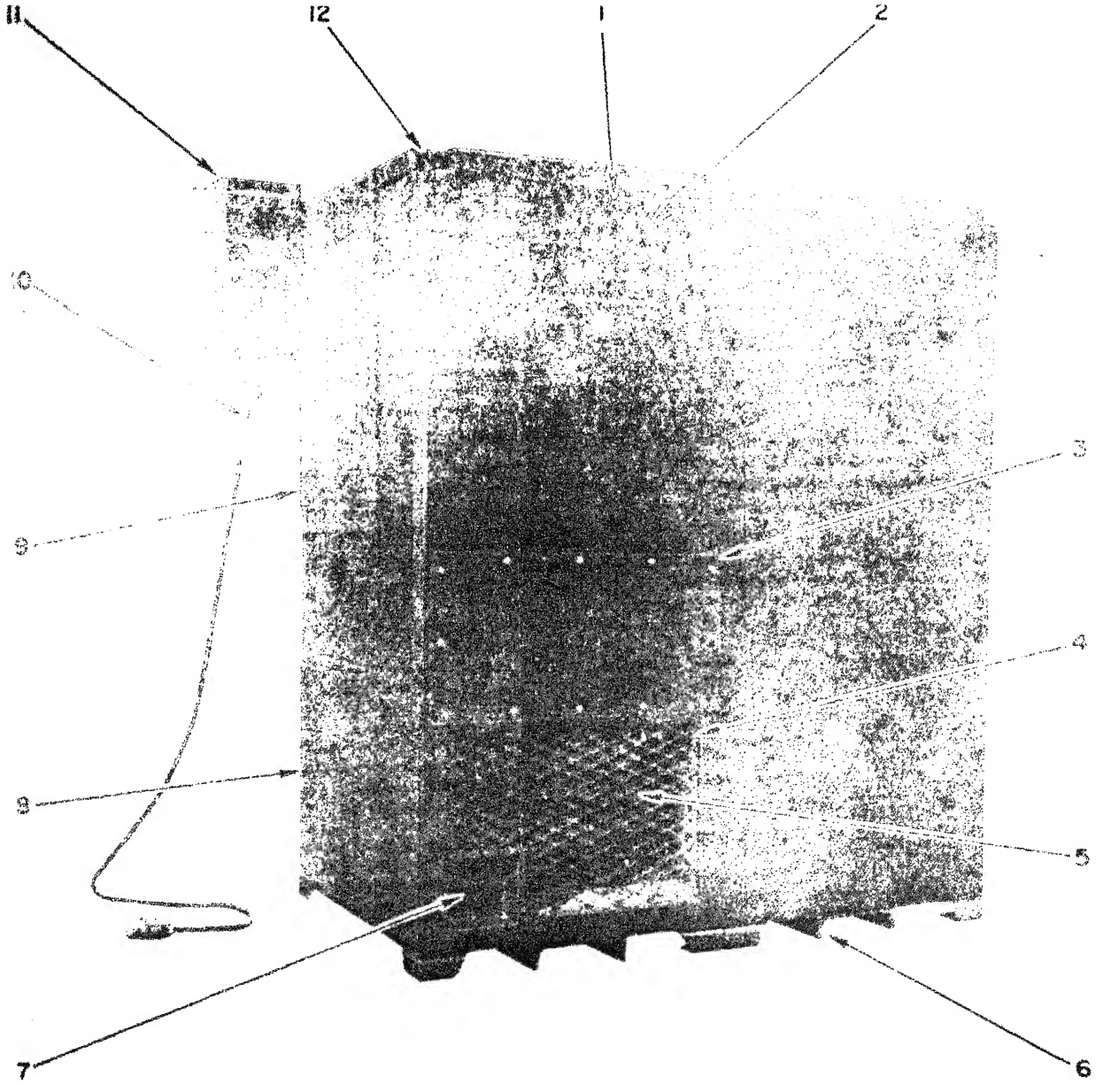


Figure 1-1. Air conditioner, three quarter, left-front view.

1 Conditioned air outlet port
2 Heater bank assembly (2)
3 Electrical tray access panel assembly
4 Recirculating air inlet port
5 Recirculating air door
6 Fork lift channel (2)
7 Vent air door control knob
8 Evaporator blower access panel assembly
9 Evaporator left-side access panel assembly
10 Remote control harness assembly
11 Remote control box assembly
12 Lifting eye (4)

Figure 1-1—Continued.

located within the glass viewing window, changes from green to yellow as the system moisture content becomes critical. System moisture content in excess of 15 ppm (parts per million) is considered critical.

o. Thermostatic Expansion Valve.

(1) The thermostatic expansion valve (fig. 1-6) is utilized to regulate liquid refrigerant flow to the evaporator. It is the dividing point between the high and low pressure sides of the system. The valve responds to the temperature of the refrigerant vapor leaving the evaporator; and regulates the amount of refrigerant entering the evaporator in exact proportion to the rate of evaporation of the liquid refrigerant in the evaporator. This controlled flow prevents the return of liquid refrigerant to the compressor.

(2) The valve consists of a body flange mounted on the inlet side of the evaporator, a cage assembly, and a power assembly with a remote temperature-sensing bulb which is clamped on the suction line leaving the evaporator. The power assembly contains a diaphragm, diaphragm chamber, capillary tube connection for the remote bulb, and a port for the external equalizing line. The remote temperature-sensing bulb, capillary tube, and the chamber formed by the diaphragm comprise a closed system which is charged with a volatile fluid. An external equalizer line is connected to the evaporator outlet. The cage assembly contains a valve pin and the superheat adjusting spring.

p. Evaporator Assembly. The evaporator assembly (fig. 1-7) consists of an evaporator cooling coil and refrigerant distributor. The evaporator is a 13 circuit, direct expansion coil of aluminum fin and copper tube construction. It removes heat from the air being conditioned by vaporization of the liquid refrigerant flowing through it. In order to assure efficient use of this multicircuited coil a distributor is used to direct equal amounts of refrigerant to each individual coil circuit. The unit is of cross-counterflow design with both air and refrigerant flowing in a horizontal plane.

q. Evaporator Blower. The evaporator blower (fig. 1-7) directs the air to be conditioned through the evaporator where it is cooled. As supplied, the evaporator fan is complete with scroll, wheel and inlet rings; and is rated at 1200 SCFM. It is a medium speed (3750 rpm), double inlet centrifugal blower with a continuous duty direct coupled motor. The evaporator fan operates on 416-volt, 3-phase, 400-cycle, 4-wire power. The motor is designed with inherent thermal and over-current protection and permanently lubricated sealed bearings.

r. Pressure Relief Valve. The pressure relief valve (fig. 1-4) is a straight through type valve, located in the refrigerant liquid line, downstream from the filter-drier. It functions to protect the system components from high internal pressure, resulting from possible malfunctions of the system or its components, by discharging the high pressure refrigerant to the atmosphere. The valve consists of a metal body which encloses a spring-loaded piston assembly. The valve is set to relieve at 350 psig internal system pressure.

s. Liquid Quench Valve. The liquid quench valve (fig. 1-4) is utilized to prevent excessive compressor inlet temperature during light-load operation when the refrigerant solenoid valve is closed and the hot gas bypass valve is open. The valve, in effect, is a small capacity expansion valve with its sensing bulb mounted to the compressor inlet line. The valve function is to de-superheat bypassed compressor discharge gas.

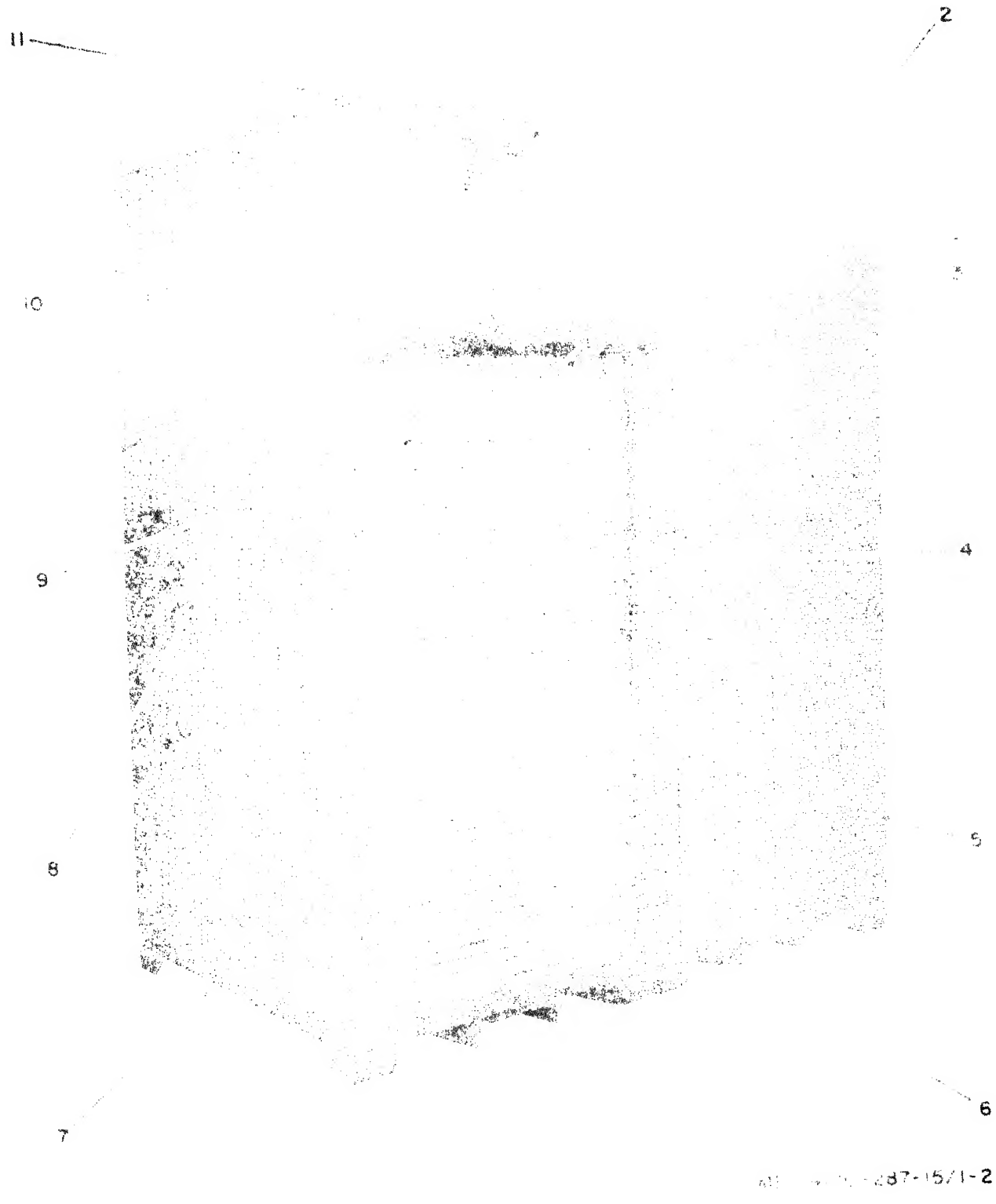


Figure 1-2. Air conditioner, three quarter, right-rear view.

1 U. S. Army identification plate
2 Evaporator rear access panel assembly
3 Liquid refrigerant sight indicator
4 Evaporator filter clean indicator
5 Vent air inlet port
6 Fork lift channel (2)
7 Condenser right-side access panel assembly
8 Condenser filter clean indicator
9 Condenser inlet air filter
10 Condenser air inlet weather cover
11 Lifting eye (4)

Figure 1-2—Continued.

t. Heater Assembly. The heater assembly (fig. 1-3) consists of six electrically operated CAL-ROD type heaters which provide a total heating capacity of 10.5 kw or 35,000 BTU/hour. The heater assembly is mounted in the evaporator outlet air stream so as to permit the evaporator fan to circulate ambient air over the heater assembly when the unit is in the heating cycle. The heater assembly operates on 416-volt, 400-cycle, 3-phase power and consumes approximately 10.5 kw. The operation of the heater assembly is controlled by the return air thermostat and the setting of the controls on the remote control box assembly.

u. Mist Eliminator. The mist eliminator (fig. 1-3) located between the evaporator assembly and the heater assembly, is constructed of eight double layers of high tru-put herringbone mesh aluminum wire enclosed in a four by four mesh aluminum wire cloth screen. The frame and drain channels are constructed of aluminum alloy. The mist eliminator causes tiny water particles in the conditioned air stream (mist) to coalesce into water droplets sufficiently large to precipitate within the mist eliminator. The precipitated water is collected in the mist eliminator drain channels; and then flows into the air conditioner drain tube (fig. 1-3).

1-4. Identification and Tabulated Data

a. Identification. The air conditioner has five major identification plates (fig. 1-8). The U.S. Army plate (A) on the rear of the air conditioner specifies the official nomenclature, including cooling capacity; Federal stock number; manufacturer, part number, serial number and date; inspection date; and contract number and unit weight. The compressor motor identification plate (B) located on top of the motor frame assembly specifies the manufacturer, part number, serial number, stock number and Stratos part number; voltage, amperage, frequency and phase requirements; horsepower, and rotational speed expressed in revolutions per minute. The compressor identification plate (C) on the upper face of the compressor specifies the manufacturer, serial number and part number. The evaporator fan motor identification plate (D) on top of the motor frame specifies the manufacturer, model number, serial number and frame number; voltages, amperages, frequency and phase requirements; horsepower and duty ratings; and rotational speed expressed in revolutions per minute. The condenser fan assembly identification plate (E) located on the fan shroud specifies the manufacturer, model number, part number and serial number; voltages, amperages, frequency and phase requirements; horsepower and duty ratings, rotational speed expressed in revolutions per minute; and direction of fan rotation and direction of air flow.

b. Tabulated Data.

(1) *Air conditioner.*

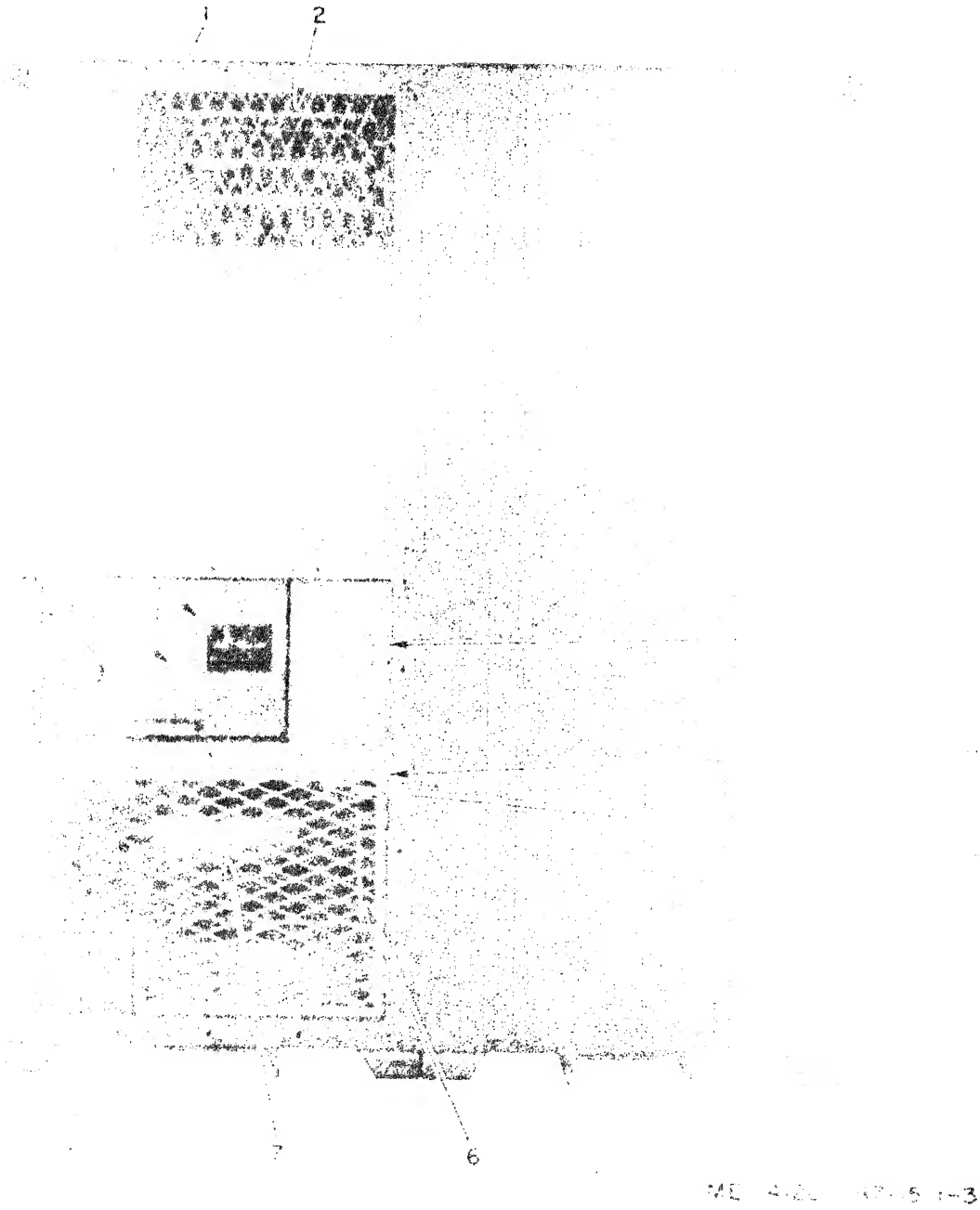
Manufacturer	Stratos Division, Fairchild Hiller Corp., Bay Shore, New York
Model	VEA4-3A
Refrigerant	Refrigerant-12 (Fed Spec BB-F-671a, Type R-12)
Capacity	38,000 BTU/hr

(2) *Compressor.*

Manufacturer	Stratos Division Fairchild Hiller Corp., Bay Shore New York
Model	FCR4-3
Part Number	26664-1
Type	Positive displacement, helical rotary

(3) *Compressor motor.*

Manufacturer	Westinghouse Electric Corp.
Part Number	923B238-2



1 Conditioned air outlet screen
2 Heater bank assembly (2)
3 Thermostat access panel
4 Recirculating air inlet screen
5 Thermostat temperature sensing bulb
6 Evaporator assembly drain tube
7 Evaporator blower scroll
8 Vent air door control knob
9 Electrical tray assembly
10 Main power supply electrical connector
11 Remote control harness assembly electrical connector
12 System reset switch
13 Master circuit breaker
14 Mist eliminator

Figure 1-3. Air conditioner, front view with panel removed.

Stratos PN 201782
Voltage ..... 416 vac
Amperage ..... 15 amps
Frequency ..... 400 cps
Phase 3-phase
Horsepower ..... 8.4 hp
Rotational Speed ..... 7700 rpm

(4) *Evaporator fan motor.*

Manufacturer ..... Aerospace Division, WELCO Industries, Inc. Cincinnati, Ohio
Part Number 02-009947
Frame Number 4720-19
Voltages ..... 208/416 vac
Amperages ..... 7.4/3.7 amps
Frequency ..... 400 cps
Phase 3-phase
Horsepower ..... 1.66 hp
Rotational Speed ..... 3750 rpm
Duty Rating ..... Continuous

(5) *Condenser fan assembly motor.*

Manufacturer ..... General Dynamics Electro Dynamic, Avenel, New Jersey
Model K9130KC38
Part Number ..... 2660-811-X (GD-ED)
Voltages ..... 208/416 vac
Amperages ..... 11/5.5 amps
Frequency ..... 400 cps
Phase 3-phase
Horsepower ..... 3.4 hp
Rotational Speed ..... 5800 rpm
Duty Rating ..... Continuous

(6) *Refrigerant solenoid valve.*

Manufacturer ..... ALCO Valve Co., St. Louis, Mo.
Type S804-FR, 1/2OD
Voltage ..... 24 vdc
Amperage ..... 1 amp
Power ..... 24 watts
Capacity ..... 18 pounds per minute of refrigerant -12 at 265 psia and 150 F at inlet, at 1 psia pressure differential across the valve.

(7) *Pressure relief valve.*

Manufacturer ..... Henry Valve Co., Melrose Park, Ill.
Part Number 5221-350
Relief Pressure ..... 350 ± 25 psig at 80 ± 20F
Reset Pressure ..... 250 ± 25 psig

(8) *Liquid quench valve.*

Manufacturer ..... ALCO Valve Co., St. Louis, Mo.
Type ..... TL-200 FL 27A
Power Assembly ..... XB1033 FL 1A
Capacity ..... 2.8 tons with refrigerant -12

(9) *Filter-drier.*

Manufacturer ..... McIntyre Co., Subsidiary of Superior Valve Co., Livingston, N. J.
Type M16-88
Flow Capacity ..... 34 pounds per minute minimum refrigerant-12 flow at 2 psi pressure drop.
Water Capacity ..... 250 drops at 75F and 200 drops at 125F at 15 ppm

(10) *Hot gas bypass valve.*

Manufacture ..... ALCO Valve Co., St. Louis, Mo.
Type CPRH-35F
Capacity ..... 390 cubic feet per hour refrigerant -12 discharge
Adjustment ..... 0 to 40 psig; set to crack at 35 to 37 psig outlet pressure

(11) *Drain-charge valve.*

Manufacturer ..... Henry Valve Co., St. Louis, Mo.
Type ..... 6231, packless
Capacity ..... 265 psig 15 300F

(12) *High-low pressure cut-out switch.*

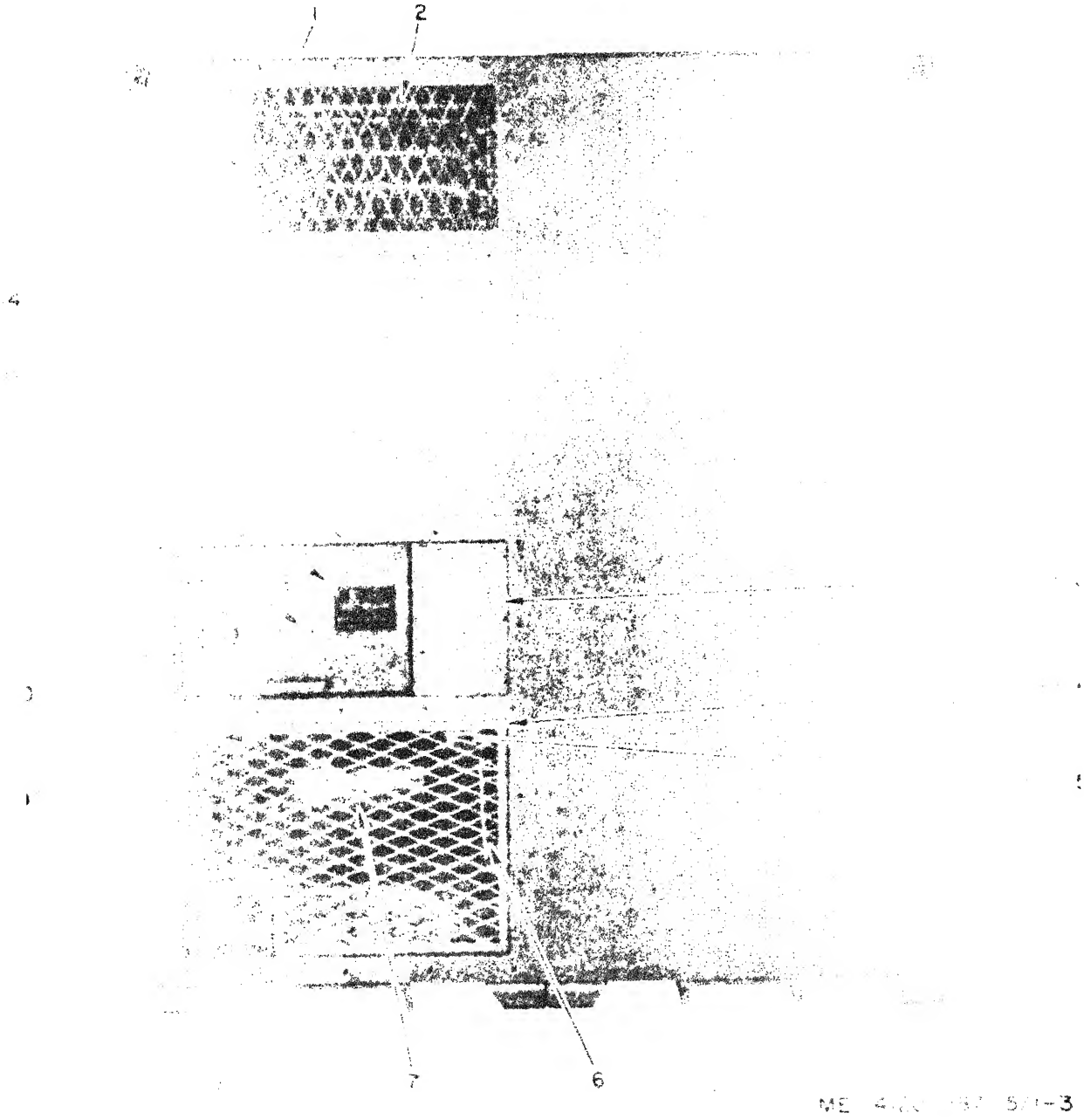
Manufacturer ..... Penn Products Division, Penn Controls, Inc., Goshen, Indiana
Type 1277BP12
Style 34
Voltage ..... 28 vdc
Amperage ..... 2 amps
Setting ..... High Pressure: trip at 265 ± 5 psig, reset at 210 ± 10 psig.
Setting ..... Low Pressure: trip at 20 (+1-0) psig, and reset at 35 ± 5 psig.

(13) *Thermoexpansion valve.*

Manufacturer ..... ALCO Valve Co., St. Louis, Mo.
Type ..... TCL-300 FW
Power Assembly ..... XB1019 FW 1B
Capacity ..... 5.0 tons with Refrigerant-12

(14) *Master circuit breaker.*

Manufacturer ..... Heineman Electric Co. Trenton, N. J.
Catalog Number ..... CD3-3 pole
Current Rating ..... 26/52 Amp
Voltage ..... 416/208 vac
Frequency ..... 400 cps



1 Conditioned air outlet screen
2 Heater bank assembly (2)
3 Thermostat access panel
4 Recirculating air inlet screen
5 Thermostat temperature sensing bulb
6 Evaporator assembly drain tube
7 Evaporator blower scroll
8 Vent air door control knob
9 Electrical tray assembly
10 Main power supply electrical connector
11 Remote control harness assembly electrical connector
12 System reset switch
13 Master circuit breaker
14 Mist eliminator

Figure 1-3. Air conditioner, front view with panel removed.

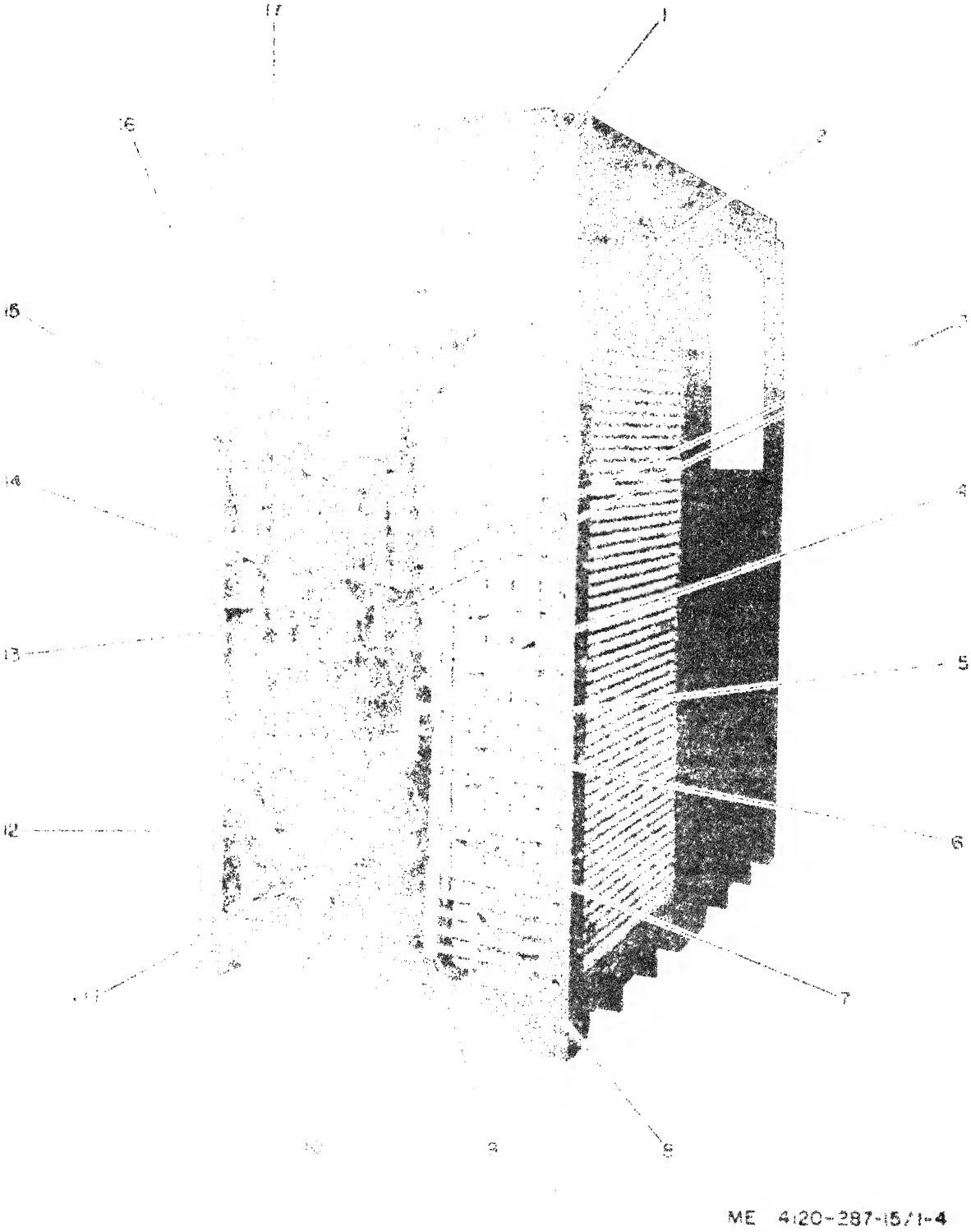


Figure 1-4. Air conditioner, right-side view with panel removed.

1 High-low pressure switch
2 Hot gas bypass valve
3 Thru-bulkhead electrical connector (2)
4 Condenser-subcooler assembly
5 Motor-compressor assembly outlet tube
6 Condenser inlet manifold tube
7 Condenser outlet manifold tube
8 Subcooler inlet manifold tube
9 Subcooler outlet manifold tube
10 Motor-compressor assembly
11 Charge valve
12 Motor-compressor assembly inlet fixture
13 Solenoid valve
14 Liquid quench valve
15 Filter-drier
16 Pressure relief valve
17 Terminal board (TB–1)

Figure 1–4—Continued.

(15) *Power transformer (T1).*

Manufacturer ---------- Microtran Co., Valley Stream, N. Y.
Model ---------- M3328
Primary Voltage ---------- 208/416 vac
Secondary Voltage ---------- 30.2 ± 1 vac (rms) for a 1.4 amp secondary load
Frequency ---------- 400 cps

(16) *Silicon rectifier (CR 1).*

Manufacturer ---------- Sarkes Tarzian Inc. 415 North College, Bloomington, Indiana
Model ---------- S–6184
Current Ratings ---------- 3.6 amps at 55C (131F) 1.6 amps at 125C (257F)

(17) *Trip relay (K101).*

Manufacturer ---------- Potter & Brumfield, Inc. Princeton, Indiana
Model ---------- MH17DM24V
Voltage ---------- 24 vdc
Contact Rating ---------- 5.0 amp at 115-volts, 60-cycle resistive load
Contact Arrangement ---------- Four pole-double throw, double make.

(18) *Time delay relay (K102).*

Manufacturer ---------- Dialtron Corp., Brooklyn, N. Y.
Model ---------- FR–3S–ND–28
Type ---------- D8497–143–1
Contact Rating ---------- 2.0 amp, 28 vdc; resistive load.
Contact Arrangement ---------- Single pole-single throw, normally open.
Nominal Delay Time ---------- 3 sec ± 25 percent at 70F.

(19) *Thermo relay (K103).*

Manufacturer ---------- Couch Ordnance, Inc., N. Quincy, Massachusetts
Model ---------- 2B36–B.
Contact Rating ---------- 5 amps, 28 vdc; minimum resistive load.

(20) *Compressor motor relay (K104).*

Manufacturer ---------- Cutler-Hammer Controls, Division of Cutler-Hammer Int., Milwaukee, Wis.
Catalog Number ---------- 9565H94 (C–H)
Military Standard ---------- MS24193 D1 (ASG)
Nominal Coil Voltage ---------- 28 vdc
Contact Arrangement ---------- Three pole-single throw
Contact Rating ---------- 50 amps, 200 vac (400 cps) rated load per contact.
Class ---------- A5 (unsealed)

(21) *Condenser fan assembly motor relay (K105).*

Manufacturer ---------- Culter-Hammer Controls, Division of Cutler-Hammer Int., Milwaukee, Wis.
Catalog Number ---------- 9565H2B (C–H)
Military Standard ---------- MS24192D1 (ASG)
Nominal Coil Voltage ---------- 28 vdc
Contact Arrangement ---------- Three pole-single throw
Contact Rating ---------- 25 amps, 200 vac (400 cps) rated load per contact.
Class ---------- A5 (unsealed)

(22) *Evaporator fan motor relay (K106).*

Manufacturer ---------- Cutler-Hammer Controls, Division of Cutler Hammer Int., Milwaukee, Wis.
Catalog Number ---------- 9565H2B (C–H)
Military Standard ---------- MS24192 D1 (ASG)
Nominal Coil Voltage ---------- 28 vdc
Contact Arrangement ---------- Three pole-single throw
Contact Rating ---------- 25 amps, 200 vac (400 cps) rated load per contact
Class ---------- A5 (unsealed)

(23) *Heater control relay (K107).*

Manufacturer ---------- Cutler-Hammer Controls, Division of Cutler-Hammer Int., Milwaukee, Wis.
Catalog Number ---------- 9565H94 (C–H)
Military Standard ---------- MS24193D1 (ASG)
Nominal Coil Voltage ---------- 28 vdc
Contact Arrangement ---------- 50 amps, 200 vac (400 cps) rated load per contact
Class ---------- A5 (unsealed)

1 Condenser air discharge door
2 Gasket
3 Piano hinge
4 Piano hinge pin
5 U. S. Army identification plate
6 Lifting eye (4)
7 Quarter-turn fastener stud receptacle (4)
8 Screw (8)
9 Nut (8)
10 Honeycomb assembly
11 Condenser fan assembly motor
12 Micro-switch (normally closed)

Figure 1-5. Air conditioner, top view with condenser discharge door open.

(24) *Thermostat.*

Manufacturer ----------Vap Air Division of Vapor Corp., Chicago, Ill.
Catalog Number ----------26420036
Ambient Temp. Range ----65F to 200F
Control Contact Setting ---100 ± 3F
Maximum Current Rating -100 ma at 30 vdc
Wattage ----------3 watts (any voltage)

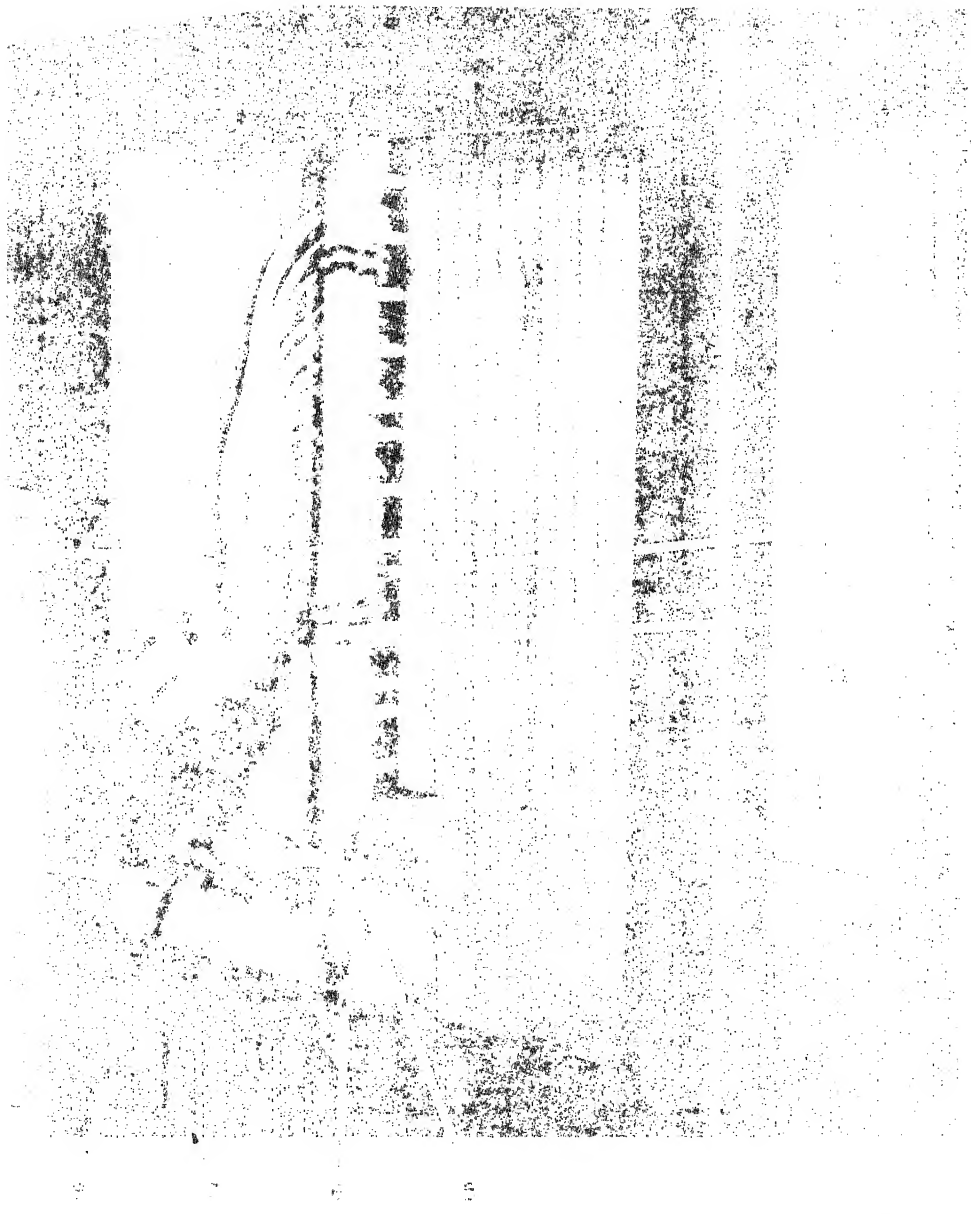
(25) *Phase sequence relay (K108).*

Manufacturer ----------Autron Mfg., Inc. Cleveland, Ohio
Model ----------AVR-869F—T6 or 4F
Nominal Rating ----------416 vac, 400 cps
Pick-up sequence ----------L1, L2, and L3, L1 and L pick-up not possible as L1, L3 and L2.

(26) *Capacities.*

Refrigerant-12 ----------10.0 pounds of refrigerant-12.
Oil ----------400 cc (16.9 fluid ounces) oil, Fed. Spec. VV-L-8 RCO-3, Type III.

(27) *Nut and bolt torque data.* Refer table 1-1, torque requirements.



1 Evaporator air inlet filter
2 Filter hold down clamp (4)
3 Evaporator outlet manifold tube
4 Evaporator clean indicator pressure sensing tube
5 Thermostatic expansion valve external equalizer tube
6 Thermostatic expansion valve remote temperature sensing bulb tubing
7 Evaporator filter clean indicator
8 Liquid refrigerant sight indicator
9 Condenser air inlet filter
10 Thermostatic expansion valve inlet tube
11 Thermostatic expansion valve bracket
12 Thermostatic expansion valve
13 Evaporator inlet distributor

Figure 1–6. Air conditioner, rear view with panels removed.

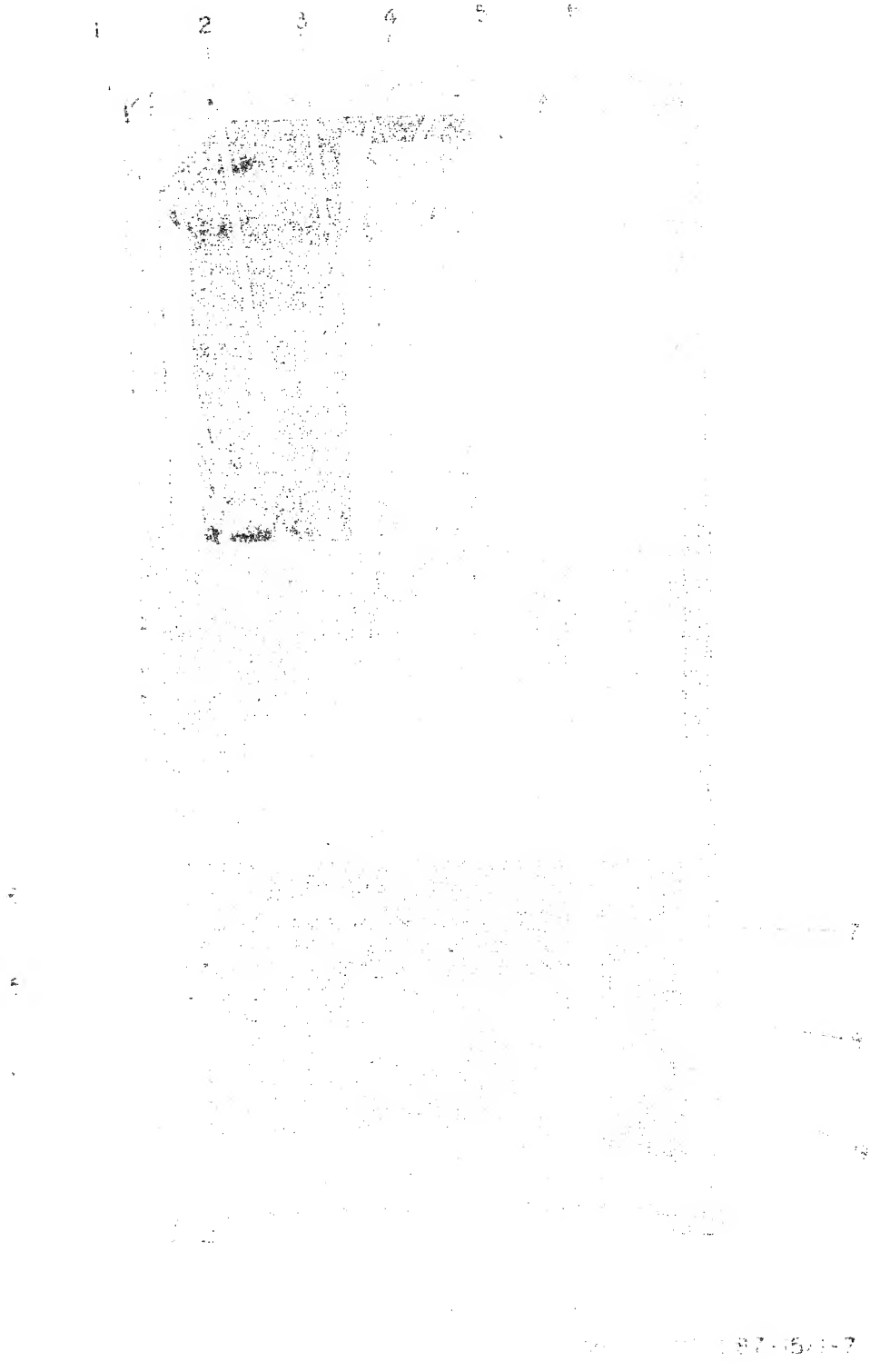


Figure 1-7. Air conditioner, left-side view with panels removed.

1 Thermostatic expansion valve
2 Evaporator inlet distributor
3 Evaporator outlet manifold tube
4 Evaporator filter clean indicator pressure sensing tube
5 Evaporator air inlet filter
6 Evaporator assembly
7 Recirculating air door link
8 Recirculating air door
9 Vent air door control knob recessed panel
10 Air circulation control link
11 Connector link
12 Vent air door link
13 Vent air door
14 Evaporator blower scroll
15 Evaporator blower wheel
16 Evaporator blower shroud

Figure 1–7—Continued.

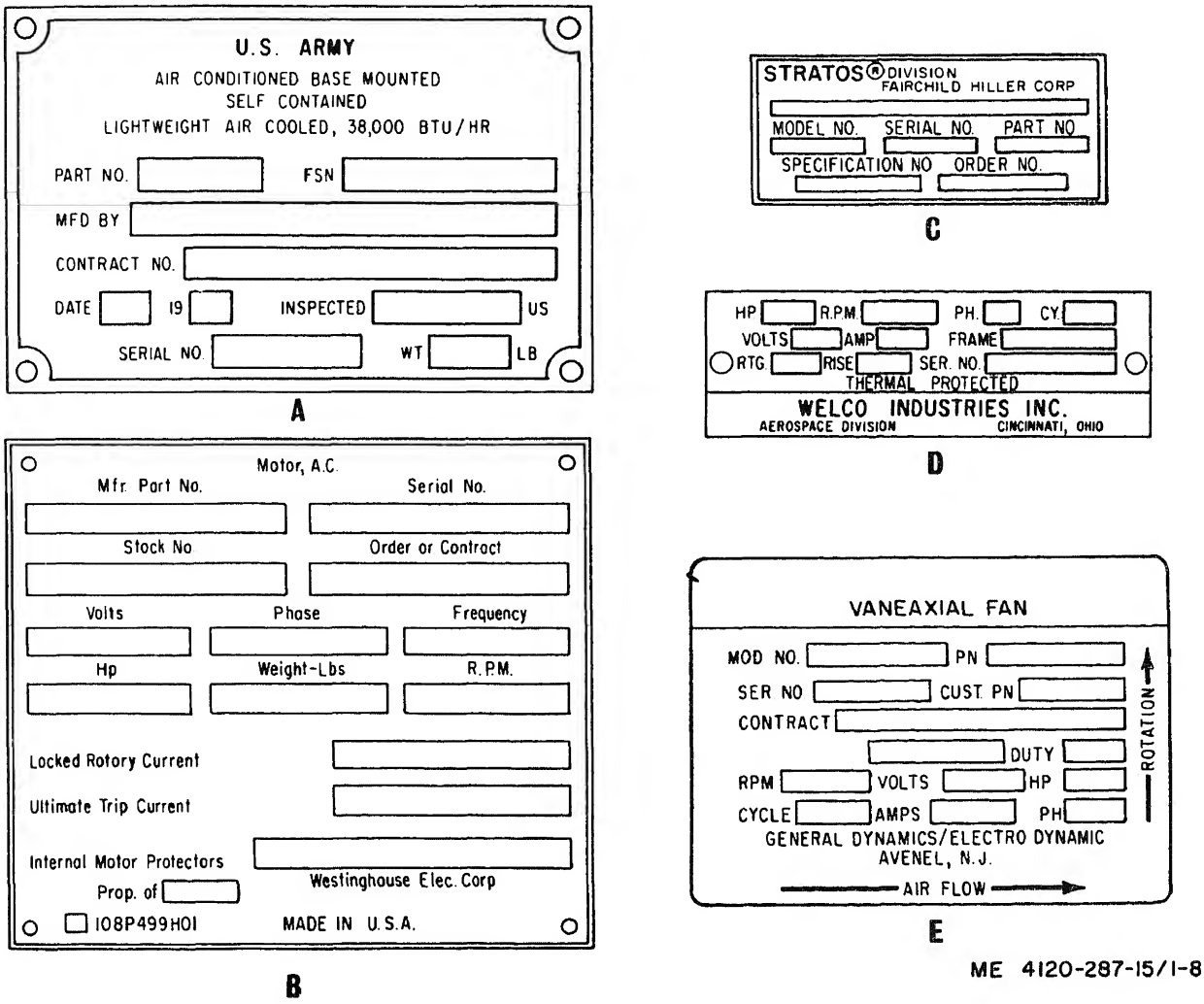


Figure 1–8. Identification plates.

Table 1–1. Torque Requirements

Tube size OD (inches)	Nut size	Aluminum tubing		Steel tubing	
		Minimum (ft-lb)	Maximum (ft-lb)	Minimum (ft-lb)	Maximum (ft-lb)
0.250	9/16 in.	40	60	135	150
0.375	11/16 in.	150	200	---	---
0.500	7/8 in.	250	350	---	---
0.625	1 in.	200	350	350	400
0.750	1–1/4 in.	300	500	350	400

(28) *Dimensions and Weight* (fig. 1-1).

Length	40.0 inches
Width	24.0 inches
Height	49.0 inches
Weight	375 pounds
Volume	27.2 cubic feet

(29) *Wiring diagram.* A practical wiri diagram of the air conditioner electrical s tem is shown in figure 1-9.

(30) *Base plan.* Refer to figure 1-10 air conditioner installation.

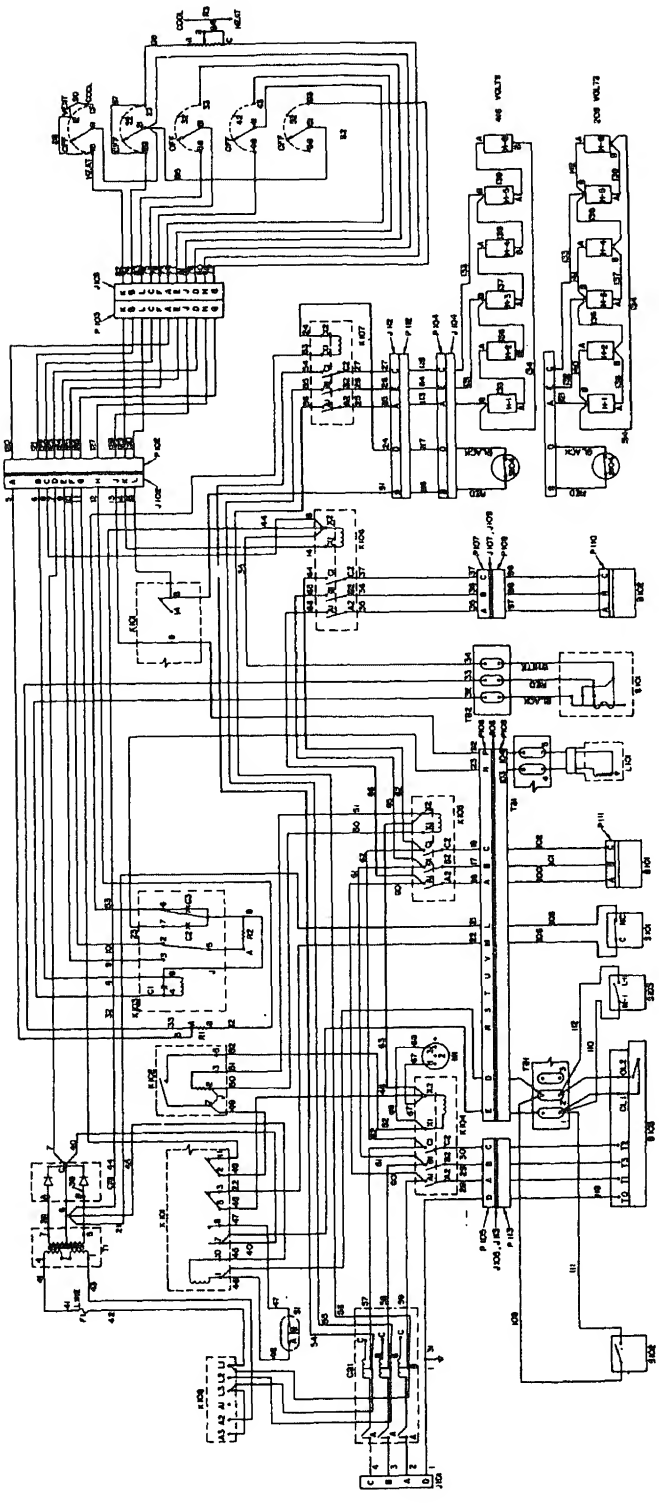


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Figure 1-9. Air conditioner electrical system wiring diagram.

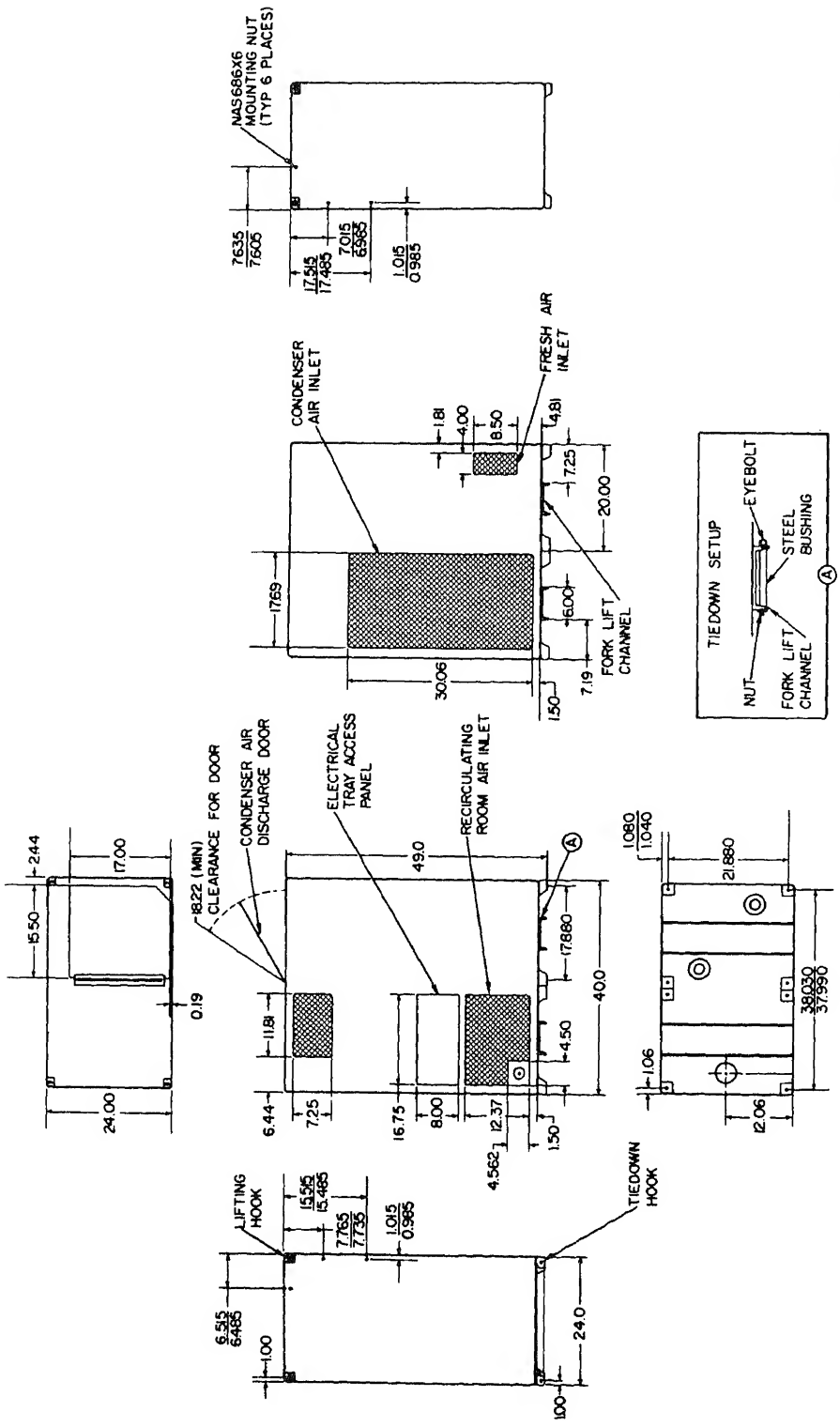


Figure 1-10. Installation and base plan.

Section III. THEORY OF OPERATION

1-5. General

This section describes the theory of operation of the refrigerant vapor cycle system.

1-6. Theory (fig. 1-11)

a. During air conditioning operation, the condenser fan draws ambient air through the condenser and discharges it through the condenser fan discharge door. The evaporator fan draws air from the compartment to be air conditioned into the evaporator section where it is mixed with fresh air (if desired) and conditioned; then the air is passed back into the compartment through the evaporator conditioned air outlet port.

b. Low pressure, low temperature refrigerant vapor (refrigerant-12) enters the compressor through the compressor inlet leading from the evaporator outlet. The refrigerant vapor is compressed to a high pressure and temperature.

c. From the compressor, the refrigerant vapor enters the condenser, where it is condensed into a high-pressure liquid by giving up heat to the condenser airstream. The electrically driven condenser fan draws cooling air through the condenser and exhausts it to atmosphere. The liquid refrigerant then collects in the receiver, upstream of the condenser. The receiver stores surplus liquid refrigerant and compensates for inequalities in flow rates.

d. After leaving the receiver, the liquid refrigerant flows through the subcooler. Subcooling is necessary because of the line pressure drop in the line leading to the thermo-expansion valve. The subcooler lowers the liquefied refrigerant temperature sufficiently (approximately 8F) to preclude flashback (vaporization) of the refrigerant on the way to the thermo-expansion valve.

e. From the subcooler, the liquid refrigerant passes through the filter-drier. The liquid refrigerant upon entering the filter-drier is directed through the drying agent and the filter screen.

f. From the filter-drier, the liquid refrigerant flows to the solenoid valve. The remote thermostat, which senses compartment temperature, controls the operation of the solenoid valve. The valve closes to stop the flow of refrigerant to the expansion valve when compartment cooling is not required. When the solenoid valve is closed, pressure in the line from the evaporator to the compressor drops because the compressor is still operating. When this pressure drops to 35 to 37 psig, the hot gas bypass valve opens permitting compressor discharge vapor to flow into the compressor inlet line. When the temperature in the compressor inlet line becomes excessive due to hot bypassed vapor, the liquid quench valve opens to permit high-pressure liquid refrigerant to vaporize and flow into the line; thereby de-superheating the bypassed vapor and reducing the line temperature to a safe superheat level entering the compressor.

g. The liquid refrigerant passes from the solenoid valve through the refrigerant liquid sight indicator, and enters the inlet port of the thermostatic expansion valve where it is metered by the action of the valve pin. The valve pin is actuated by a diaphragm whose position is determined by the evaporator load and the superheat level sensed by the valve thermal bulb. To compensate for the effect of pressure drop across the evaporator, an external pressure equalizing line is connected between the evaporator outlet and the chamber below the valve diaphragm. Thus, the true evaporator outlet pressure is exerted beneath the valve diaphragm. The operating pressures on the valve diaphragm are now free from the effect of the pressure drop through the evaporator, and the expansion valve will respond to the superheat of the refrigerant vapor leaving the evaporator.

h. The thermostatic expansion valve is factory adjusted to maintain a nominal 5F superheat setting. The valve function is to maintain the nominal superheat setting in the evaporator, as dictated by the thermal sensing bulb. This is accomplished by modulating the flow rate of liquid refrigerant to the evaporator.

i. The actual cooling effect in this vapor cycle system occurs in the evaporator where the liquid refrigerant is evaporated under re-

duced pressure. In vaporizing, the refrigerant absorbs heat from the air being drawn through the evaporator by the evaporator fan, thereby reducing the temperature of the air which then flows to the compartment to be air conditioned. The lowpressure, low-temperature refrigerant vapor then leaves the evaporator and flows through the compressor suction line through the compressor motor windings, to the compressor assembly and the cycle is repeated.

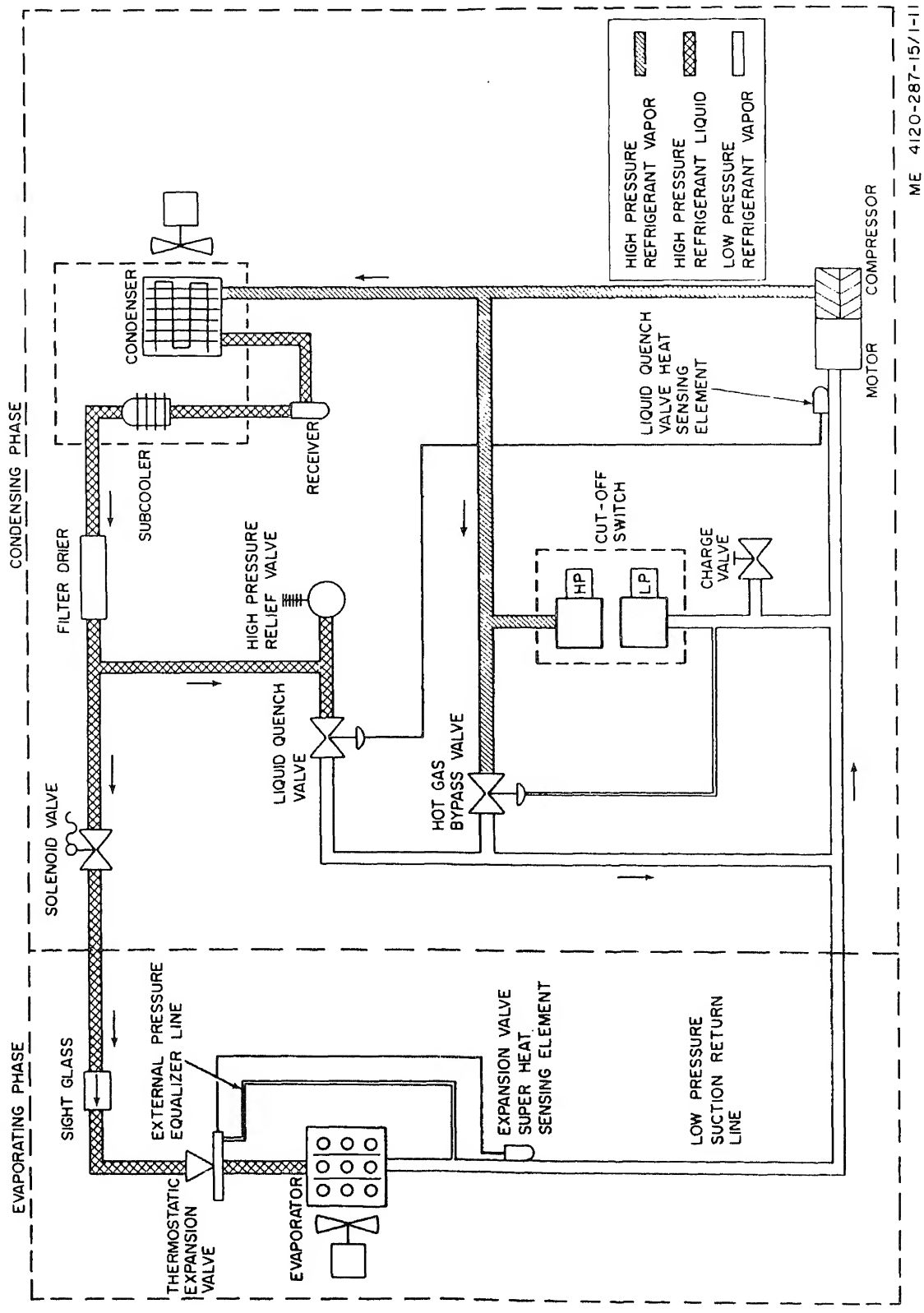


Figure 1-11. Refrigerant vapor cycle schematic diagram.

CHAPTER 2

INSTALLATION AND OPERATION INSTRUCTIONS

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unloading Equipment

a. The air conditioner is shipped in a single wood crate, packaged for shipment in conformance with Military Specification MIL-P116C, and Federal Specifications PPP-B-636 and PPP-B-601.

b. Lift the packaged air conditioner from the carrier using a hoisting device with a minimum rating of 750 pounds capacity.

Caution: **When unloading the unit be careful to avoid damage to the air conditioner and separately packaged components. Make sure the air conditioner maintains an upright position during unloading.**

2-2. Unpacking Equipment

The air conditioner is securely fastened to supports and bolted to a wooden skid within the crate as shown in figure 2-1. Unpack equipment as follows:

a. Cut the metal straps, and uncrate the air conditioner.

b. Carefully remove the barrier paper and tape.

c. Remove the eight bolts securing the air conditioner to the wood skid. Using one of the following two methods, remove the air conditioner from the skid.

(1) Using the four lifting eyes in the top corners of the cabinet (fig. 1-10) lift the air conditioner with a sling. Use spreader bars to maintain a 90-degree angle between the sling and cabinet top panel while lifting air conditioner off skid.

Caution: **Guy ropes must be used to prevent excessive swinging that might damage the air conditioner when a hoisting device is used.**

(2) Using a fork lift with suitable fork prong dimensions, insert fork lift prongs into fork lift channels formed by the base of the air conditioner (fig. 1-10). Elevate slightly and check stability of unit; then lift air conditioner off skid.

d. Open the separate shipping carton and unpack the remote control box and wiring harness assemblies.

Note. Tiedown points, located at each of the four ends of the fork lift channels, facilitate moving the air conditioner after its been uncrated. When using the tiedown points place a pipe bushing at the four points between the holes in the ends of the fork lift channels (fig. 1-10); then attach an eyebolt and clevis through the bushings to provide for attaching the tiedown straps to the air conditioner.

2-3. Inspecting and Servicing Equipment

a. A complete inspection of the air conditioner should be made upon receipt of unit. Inspect the air conditioner as follows:

(1) Remove the housing panels (para 3-23 thru 3-29), and open the condenser discharge door (para 3-30).

(2) Inspect the housing panels and condenser discharge door for dents, breaks, missing or defective fasteners, loose welds or rivets, defective gaskets, and damaged insulation (para 3-21 thru 3-30).

(3) Visually inspect the entire unit for cracks, breaks, loose or missing hardware, loose connections, and broken or damaged wire leads. Inspect for any tampering or damage that may have occurred in transit.

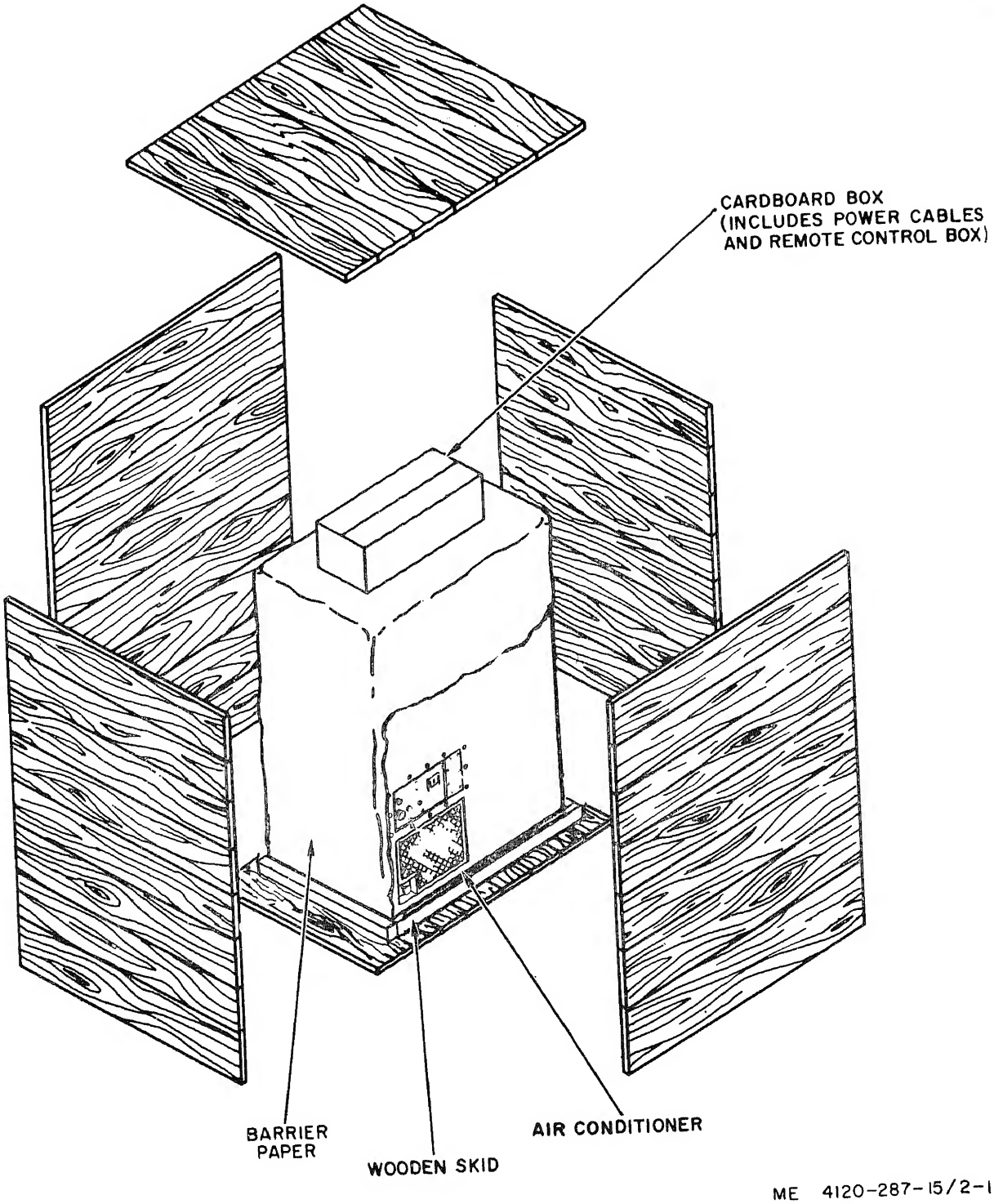


Figure 2-1. Air conditioner shipping package.

(4) Examine the evaporator and condenser assembly air inlet filters for dirt, dust or other obstructions (para 3–10 and 3–11).

(5) Inspect the remote control box assembly air conditioning switch and temperature control rheostat for proper operation.

(6) Examine the remote control wiring harness for possible defects (para 3–38).

(7) Check the master circuit breaker for proper operation. Set master circuit breaker to OFF position.

(8) Make sure that a good fuse is in the electrical tray fuse holder (para 3–37).

(9) Inspect the air conditioner thermostat for physical damage and security of mechanical and electrical connections (para 3–39).

(10) Check all air conditioner components for security of attachment.

(11) Visually inspect the compressor area for indications of oil or refrigerant leaks.

(12) Correct all deficiencies or report them to direct support maintenance.

(13) Install all air conditioner housing panels and close the condenser discharge door (para 3–23 thru 3–30).

b. When using the air conditioner perform daily preventive maintenance services in accordance with paragraph 3–6.

2–4. Installation Instructions

a. Due to conditions which may vary at the worksite detailed installation instructions are not provided with this manual. Steps described in this paragraph are minimum installation requirements necessary for efficient operation of the air conditioner. Adaptations should be made to conform with ductwork existing at the installation site. See figure 1–10 for installation and base plan space requirements.

(1) Using the lifting method described in paragraph 2–2*c* (1) or (2), position the air conditioner in the appropriate location on the shelter (or trailer) so that the conditioned air outlet and recirculating air inlet ports line up with the provided ducting at the installation site.

(2) Make sure that unobstructed outdoor ambient air flow is available at the condenser air inlet, condenser air discharge, and vent a inlet ports.

(3) Secure the air conditioner to mounting base using the eight mounting ho provided in the base of the air condition (fig. 1–10). When necessary, use shims to leve air conditioner.

Note. An air tight seal must be maintained between external ducting and the air conditioner for efficient operation. Make certain that the ducting and air conditioner are properly alined after leveling air conditioner.

(4) Mount the remote control box assembly on a wall or panel at a convenient level for operation.

Note. Remove electrical tray assembly panel (para 3–25) and store for future use.

(5) Connect remote control wiring harness plug P103 to remote control box assembly receptacle J103 (figs. 1–3 and 2–2). Connect remote control wiring harness plug P102 to electrical tray remote control receptacle J102 (figs. 1–3 and 2–3).

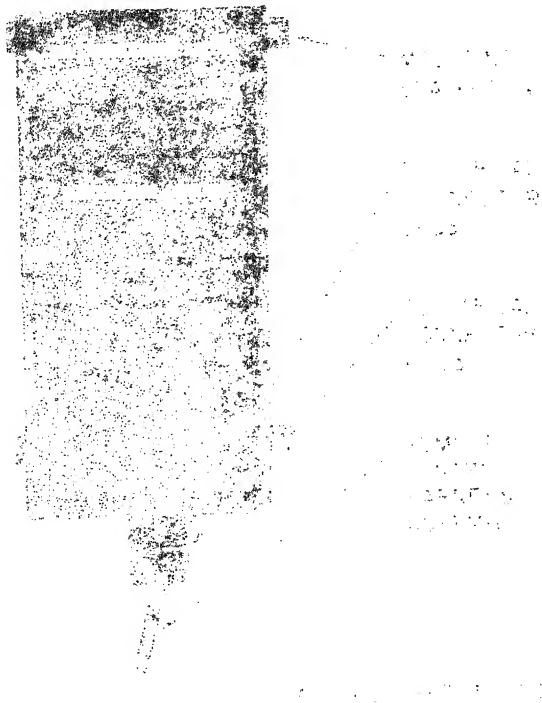


Figure 2–2. Remote control box assembly.

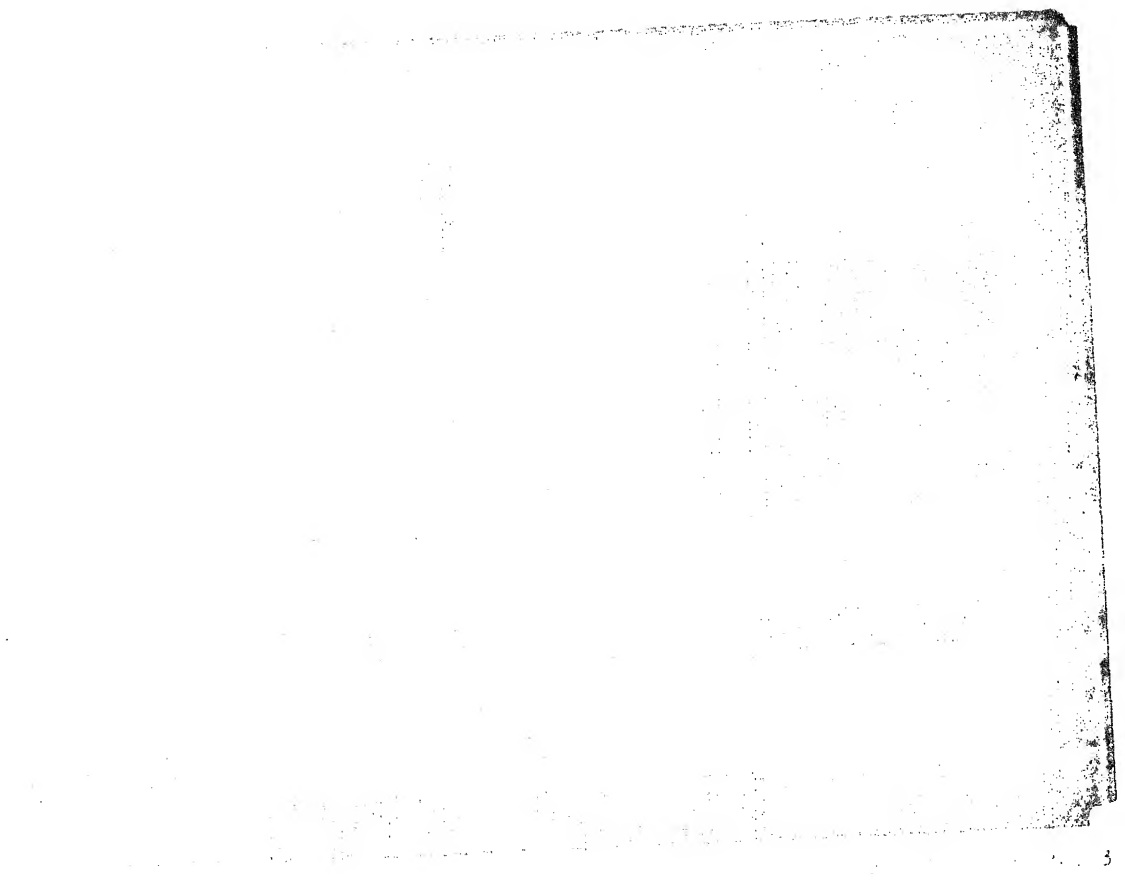


Figure 2-3. Electrical tray assembly control panel.

Warning: **Make sure MASTER CIRCUIT BREAKER is set to OFF position before connecting P102 to J102.**

(6) Connect input power plug P101 to a 416-volt, 3-phase, 400-cycle, 4-wire power source. Make sure ground wire of 4-wire source is connected to plug P101 terminal D. Connect wire carrying phases 1, 2, and 3 to plug P102 terminals A, B, and C, respectively.

Warning: **Make sure main power supply is disconnected before attempting to wire P101. Make sure master circuit breaker is set to OFF position before connecting P101 to J101.**

(7) Connect input power plug P101 to electrical tray input power receptacle J101 (fig. 2-3).

Caution: **The air conditioner is wir to operate from a 416-volt, 3-phase, 400-cyc 4-wire power source. Make sure power sour supply is correct before attempting start**

(8) Check phase relationship by starti air conditioner in accordance with paragra 2-10. If the air conditioner does not start erating (as evidenced by no airflow from c ditioned air outlet duct) perform the follc ing:

(*a*) Set master circuit breaker to O position, and disconnect main power supp

(*b*) Disconnect plug P101 from in power receptacle J101 and main power supp

(*c*) Switch any two "hot" leads at in power plug P101.

(*d*) Reconnect main power supply. Make sure master circuit breaker is set to OFF position; then connect plug P101 to electrical tray input power receptacle J101.

(*e*) Restart air conditioner; if the air conditioner still does not operate refer to paragraph 3–12.

(9) In the event that pre-filtered, de-contaminated fresh air is required for air conditioning, the shelter's fresh air supply must first be passed through a special filtering and de-contaminating unit which is an integral part of the shelter's equipment (mounted under the air conditioning unit and connected with a flexible duct to the air conditioner filtered air inlet (fig. 1–10). This prefiltered a supply is then discharged to the filtered fre air intake, located beneath the evaporator fa The fresh air door control handle must b turned counter-clockwise to the closed positio when de-contaminated fresh air is required.

b. When installing Model VEA4–3A air co ditioning unit indoors perform all steps spec fied in paragraph 2–4*a*. Additional ductwork must be provided as follows:

(1) Provide suitable ductwork to carry condenser discharge air away from area being cooled.

(2) Provide suitable ductwork to supply fresh air to the condenser inlet and fresh air inlet (fig. 1–10).

Section II. MOVEMENT TO NEW WORKSITE

2–5. Dismantling for Movement

a. Short Distance. When moving the air conditioner to a new worksite which is a short distance away, perform the following:

(1) Set air conditioning switch, located on remote control box assembly, to OFF position. Set the master circuit breaker switch to OFF position.

(2) Turn off main power supply. Disconnect power plug (P101) from input power receptacle (J101) at electrical tray front panel.

(3) Disconnect remote control wiring harness plug (P102) from electrical tray remote control receptacle (J102) and from base of remote control box.

(4) Remove the remote control box assembly from its mounting.

(5) Close and secure the condenser air discharge door. Replace panel over electrical tray front panel. Make sure all panels are secure.

(6) Release the eight mounting bolts securing air conditioner to mount.

(7) Using the lifting method described in paragraph 2–2*c* (1) or (2), place the air conditioner on rolls or a skid.

b. Long Distance. When moving the air conditioner to a new worksite which is a long distance away, perform steps 2–5*a* (1) through (4); then perform the following:

(1) Place a shipping plug on the high-pressure relief valve outlet port.

(2) Close and secure the condenser air inlet door. Replace panel over electrical tray front panel. Make sure all panels are secure.

(3) Release the eight mounting bolts securing air conditioner to mount.

(4) Inspect the air conditioner to determine its condition. Correct deficiencies before placing equipment in limited storage. Perform technical inspections on unboxed items in accordance with AR 743–505.

(5) Using a cloth dampened with an approved solvent clean the air conditioner. Dry thoroughly.

(6) Paint all surfaces as needed. Refer to TM 9–213.

(7) Coat machined surfaces with preservative, or cover with barrier material. Coat exposed metal surfaces with preservative.

(8) Using pressure tape, seal all openings.

(9) Wrap air conditioner in two layers of barrier paper, and pack it in a wooden crate. Provide a separate container for remote control box and wiring harness; pack items firmly in cellulose wadding or other protective material.

(10) Securely nail wooden crate closed, and wrap with steel handling strips.

(11) Using the lifting method described in paragraph 2-2c (1) or (2), place air conditioner on bed of carrier.

(12) Securely block or tie the crated air conidtioner on the carrier. If the carrier has a wooden floor, spike the crated air conditioner to the carrier bed.

(13) Store air conditioner in a room maintained at an even temperature and relatively low humidity. Cover entire air conditioner with a tarpaulin when no suitable storage facility is available.

2-6. Reinstallation after Movement

a. Short Distance. Reinstall air conditioner according to paragraph 2-4, after moving air conditioner a short distance (para 2-5*a*).

b. Long Distance. Reinstall air conditioner according to paragraphs 2-3 and 2-4, after moving air conditioner a long distance (para 2-5*b*).

Section III. CONTROLS AND INSTRUMENTS

2-7. General

This section describes, locates, illustrates, and furnishes operator, crew, or organizational maintenance personnel sufficient information about various controls and instruments for proper operation of the air conditioner.

2-8. Controls and Instruments

a. Remote Control Box. The air conditioning switch and the continuously variable temperature control resistor (fig. 2-2) are flush mounted on the front of the remote control box assembly. The switches function as follows:

(1) *Air conditioning switch.* The four-position heat-off-vent-cool, five-deck air conditioning switch controls the air conditioner mode of operation. When in the HEAT position the evaporator fan is placed in operation and the heater circuit is closed and controlled by the temperature control variable resistor. When in the OFF position all relays are deenergized, and the air conditioner does not condition the shelter air. When in the VENT position the air conditioner recirculates the shelter air with the evaporator fan; fresh air may be drawn into the shelter by turning the fresh air control handle, located in lower left hand front section of air conditioner, to OPEN position. When in the COOL position the motor-compressor circuit is closed, the evaporator and condenser fans are energized, and the cooling system starts to function—cooling the shelter air.

(2) *Temperature control.* The continuously variable temperature control resistor controls the air conditioner return air temperature. The temperature range on the cooling cycle is from 60° F to 90° F. The temperature range on the heating cycle is from 60° F to 90° F.

b. Electrical Tray Panel. The system reset switch, elapsed time meter, 28V DC supply 3/4 amp fuse indicator light and fuse holder, and the master circuit breaker (fig. 2-3) are flush mounted on the front panel of the electrical tray assembly. The control and instrument functions as follows:

(1) *System reset switch.* This push button-type switch must be reset (depressed) in the event that the low ambient temperature switch, or the compressor motor thermal overload contacts in the refrigerant circuit are tripped.

(2) *Elapsed time meter.* Culminative air conditioner operating time is registered on the elapsed time meter. Total operating time is read by locating the black bubble in the meter's mercury column and noting the bubble height on the graduated scale along side of the mercury column. The scale meter range is from 0 to 10,000 hours, each scale division being equivalent to 100 hours operating time.

(3) *Master circuit breaker.* This circuit breaker controls the power supplied to the air conditioner through the power input receptacle P101. This switch has ON (up) and OFF (down) positions.

(4) *28V DC Supply 3/4 amp fuse indicator and fuse holder.* This indicator lamp lights when the 28-volt dc supply line overloads and blows the 28-volt dc fuse.

c. Monitoring Instruments. The liquid refrigerant sight indicator and moisture indicator, and the evaporator and condenser section filter clean indicators, continuously monitor the air conditioner air circulation system and vapor cycle system. The daily and quarterly preventive maintenance services (para 3–6 and 3–7) must be performed as indicated by the monitoring instrument readings for the air conditioner to operate at its rated capacities.

(1) *Refrigerant liquid line sight glass and moisture indicator.* The refrigerant liquid sight indicator (fig. 2–4) flush mounted beneath the evaporator rear access panel, allows visual observation of the refrigerant-12 flow. Bubbles, or a milky appearance in the sight glass indicate a shortage of refrigerant or a restricted liquid line. The moisture indicator, located within the refrigerant liquid sight indicator, indicates moisture level in the vapor cycle system by changing color from green to yellow. Notify field maintenance should the moisture indicator turn yellow, or bubbles appear in the sight glass.

(2) *Evaporator filter clean indicator.* The evaporator filter clean indicator (fig. 2–4) flush mounted beneath the evaporator rear access panel, monitors the velocity of air passing through the evaporator filter screen. When the indicating ball rises to the upper arrows (fig. 2–4) service the evaporator inlet filter (para 3–11).

(3) *Condenser filter clean indicator.* The condenser filter clean indicator (fig. 2–5.) flush mounted on the air conditioner rightside panel, monitors the velocity of air passing through the condenser filter screen. When the indicating ball rises to the upper arrows (fig. 2–5.) service the condenser air inlet filter (para 3–10).

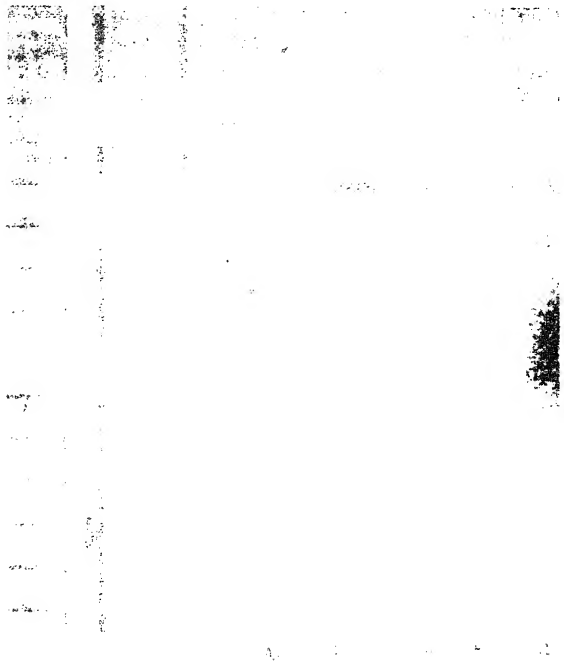


Figure 2–4. Refrigerant liquid sight indicator and evaporator filter clean indicator.

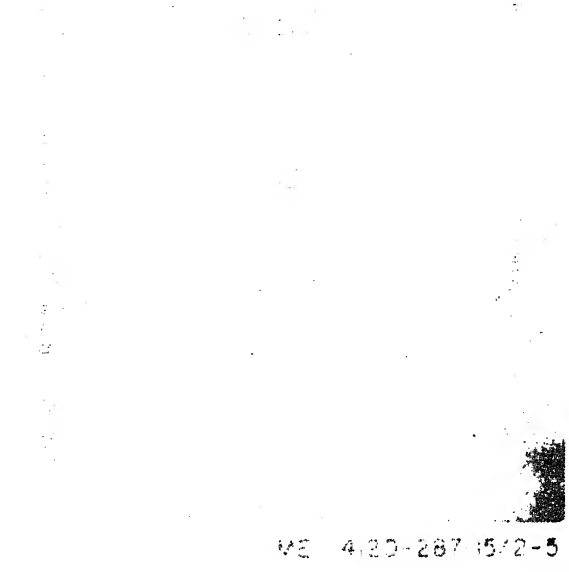


Figure 2–5. Condenser filter clean indicator.

Section IV. OPERATION OF EQUIPMENT

2-9. General

a. Instructions in this section are published for information and guidance of personnel responsible for operation of the air conditioner.

b. The operator must know how to perform every operation of which the air conditioner is capable. This section gives instructions on starting and stopping the air conditioner, and in setting the air conditioner mode of operation.

2-10. Starting

a. Preparation for Starting.

(1) Perform necessary daily preventive maintenance services (para 3-6).

(2) Check air conditioning requirements to determine necessary mode of operation.

b. Starting. When starting the air conditioner perform the following:

(1) Set the air conditioning switch and master circuit breaker switch to their OFF position (fig. 2-2 and 2-3).

(2) Turn the fresh air control knob (fig. 1-3) to the OPEN or CLOSE position, depending on shelter air conditioning requirements as determined in step *a* (2) of this paragraph.

(3) Set the air conditioning switch to either the HEAT, VENT, or COOL mode of operation position as determined in step *a* (2) of this paragraph.

(4) Open condenser air discharge door when air conditioning switch is set for COOL mode of operation.

(5) Place the master circuit breaker in the ON (up) position (fig. 2-3).

(6) Set the temperature control variable resistor as necessary to achieve the desired shelter air temperature range.

Note. The temperature control variable resistor setting has no effect when the air conditioning switch is set in the VENT position.

2-11. Stopping

a. Stopping Procedure. When stopping the air conditioner perform the following steps:

(1) Set the air conditioning switch to the OFF position.

(2) Set the master circuit breaker switch to the OFF (down) position.

b. Perform the necessary daily preventive maintenance services (para 3-6).

2-12. Operating under Unusual Conditions

a. When starting the air conditioner under unusual conditions perform the following steps:

(1) Perform necessary daily preventive maintenance services (para 3-6).

(2) Check air conditioning requirements to determine necessary mode of operation.

(3) Set the air conditioning switch to the OFF position.

(4) Turn the fresh air control knob (fig. 1-3) to the OPEN or CLOSE position, depending on air conditioning requirements determined in step (2) above.

(5) Make sure the condenser air outlet door (fig. 1-5) is open.

(6) Connect the remote control wiring harness plug (P102) to the remote control receptacle (J102) located on the electrical tray front panel.

(7) Connect the main power cable to the input power plug P101 in accordance with paragraph 2-4*a*(6). Connect plug P101 to power input receptacle J101.

(8) Set the air conditioner switch and temperature control switch in accordance with paragraph 2-10 *b* (3) and (6).

(9) Place the master circuit breaker in the ON (up) position (fig. 2-3) to start air conditioner.

b. When stopping the air conditioner perform the following:

(1) Set the air conditioning switch in the OFF position.

(2) Place the master circuit breaker in the OFF (down) position.

(3) Perform the necessary daily preventive maintenance services (para 3-6).

2-13. Operation in Dusty or Sandy Areas

Caution: When operating the air conditioner in sandy or dusty areas, install a screen or porous cloth over the condenser air inlet metal grill (fig. 1-1) and the inlet opening of the fresh air door (fig. 1-1). Clean the evaporator and condenser assemblies and filters frequently (para 3-10 and 3-11). Provide a structure to protect the air conditioner from abrasion damage; arrange for adequate ventilation; paint all surfaces that have chipped or peeled.

2-14. Operation Under Rainy or Humid Conditions

Caution: When operating the air conditior er under rainy or humid conditions or in d. rect sunshine, provide a structure to protect the air conditioner from rain and moisture or direct sunshine. Provide adequate ventilation; keep electrical components dry and clean; paint all surfaces that have chipped or peeled.

Section V. OPERATION OF AUXILIARY MATERIAL USED IN CONJUNCTION WITH THE AIR CONDITIONER

2-15. Fire Extinguisher (Monobromotrifluoromethane Type)

a. Description. The monobromotrifluoromethane type fire extinguisher is generally suitable for all types of fire, except fires involved with LOX (liquid oxygen) generating equipment. The fire extinguisher is furnished with a disposable type cylinder.

b. Operation. To operate the fire extinguisher perform the following:

(1) Remove fire extinguisher from its location.

(2) Break seal by pulling safety pin from handle.

(3) Point horn at base of flame.

(4) Press trigger for discharge and direct stream at base of flame.

(5) Replace cylinder immediately after using.

c. Replacement of Cylinder. To replace cylinder, perform the following:

(1) Press lever to release pressure from used cylinder.

(2) Loosen swivel valve coupling nut and remove valve assembly from cylinder.

(3) Remove instruction band from used cylinder.

(4) Place new cylinder through instruction band.

(5) Replace safety pin in valve and seal pin with sealing wire.

(6) Attach valve assembly and tighten swivel coupling nut on the new cylinder and place fire extinguisher in mounting bracket.

(7) Adjust instruction band on cylinder to show maintenance and operating instructions.

d. Maintenance. Weigh fire extinguisher every 3 months and replace cylinder if gross weight has decreased 4 ounces or more. Lubricate cylinder neck threads with one drop of OE 30 oil before reassembly.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR AND ORGANIZATIONAL MAINTENANCE TOOLS AND EQUIPMENT

3–1. Special Tools and Equipment

No special tools or equipment is required by operator or organizational maintenance personnel for maintenance of the air conditioner.

3–2. Basic Issue Tools and Equipment

Tools and repair parts issued with or authorized for use with the air conditioner are listed in the basic items list, appendix B of this manual.

Section II. LUBRICATION

3–3. General Lubrication Information

a. During normal operation and maintenance procedures the air conditioner requires no lubrication.

b. Lubricant is added to the refrigerant system only when recharging the air conditioner with refrigerant. Refer to support and depot maintenance.

3–4. Detailed Lubrication Information

a. General. Keep lubricant in closed container and store in a clean, dry place away from external heat. Allow no dust, dirt, or other foreign material to mix with the lubricant. Keep all lubrication equipment clean and ready to use.

b. Lubrication. Lubricant is added to the refrigerant system in accordance with paragraph 7–10. Refer to field maintenance.

Section III. PREVENTIVE MAINTENANCE SERVICES

3–5. General

To insure that the air conditioner is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. The necessary preventive maintenance services to be performed are listed and described in paragraphs 3–6 and 3–7. Item numbers indicate the sequence of minimum inspection requirements. Defects discovered during operation of the unit shall be noted for future correction, to be made as soon as operation has ceased. Stop operation immediately if a deficiency is noticed which would damage the equipment if operation were continued. All deficiencies and shortcomings will be recorded together with the corrective action taken on DA Form 2404 at the earliest possible opportunity.

3–6. Daily Preventive Maintenance Services

This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by the operator.

The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 3–1 for the daily preventive maintenance services.

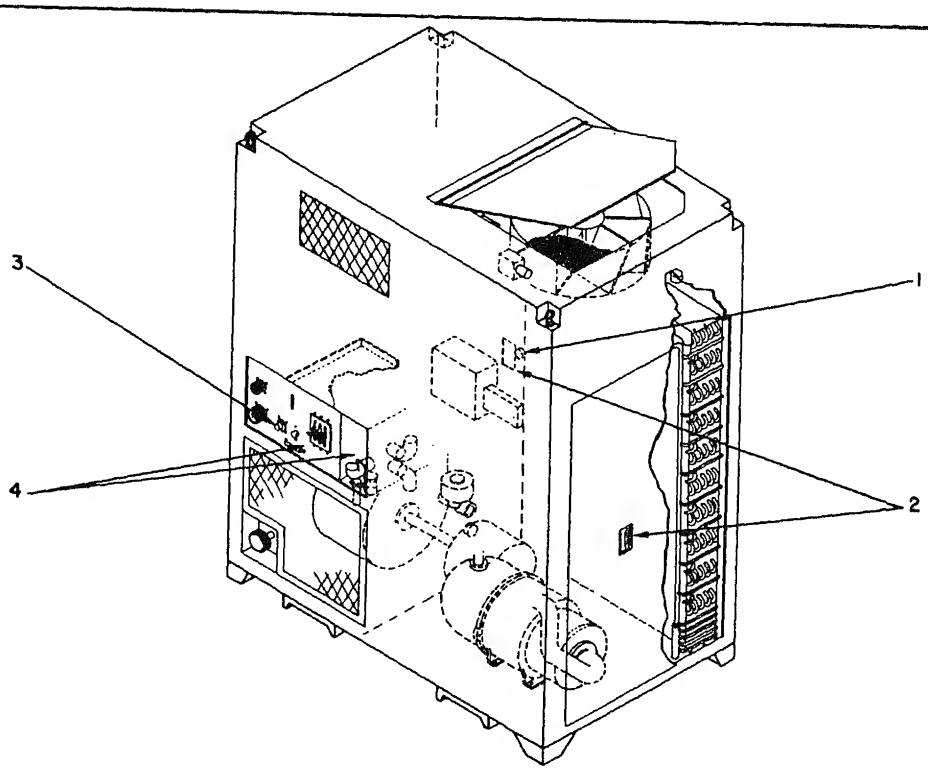
3–7. Quarterly Preventive Maintenance Services

a. This paragraph contains an illustrated tabulated listing of preventive maintenance services which must be performed by organizational maintenance personnel at quarterly intervals. A quarterly interval is equal to 3 calendar months, or 1800 hours of operation, whichever occurs first.

b. The item numbers are listed consecutively and indicate the sequence of minimum requirements. Refer to figure 3–2 for the quarterly preventive maintenance services.

Note. The motor compressor will be replaced and overhauled at 4000 hours of operation (para 5–20).

PREVENTIVE MAINTENANCE SERVICES
DAILY



ITEM		PAR REF
1	REFRIGERANT LIQUID SIGHT GLASS. Inspect refrigerant liquid sight glass while the unit is operating. Milky flow indicates moisture; bubbles indicate low charge—report either condition to organizational maintenance.	2-9. c. (1) 5-19. a., b.
2	FILTER CLEAN INDICATORS. Inspect the filter clean indicators while the air conditioner is operating. Clean or replace the evaporator and/or condenser air inlet filter when indicator ball rises to SERVICE position.	2-9. c. (2) 2-9. c. (3) 3-10. 3-11.

ME 4120-287-15/3-1 (1)

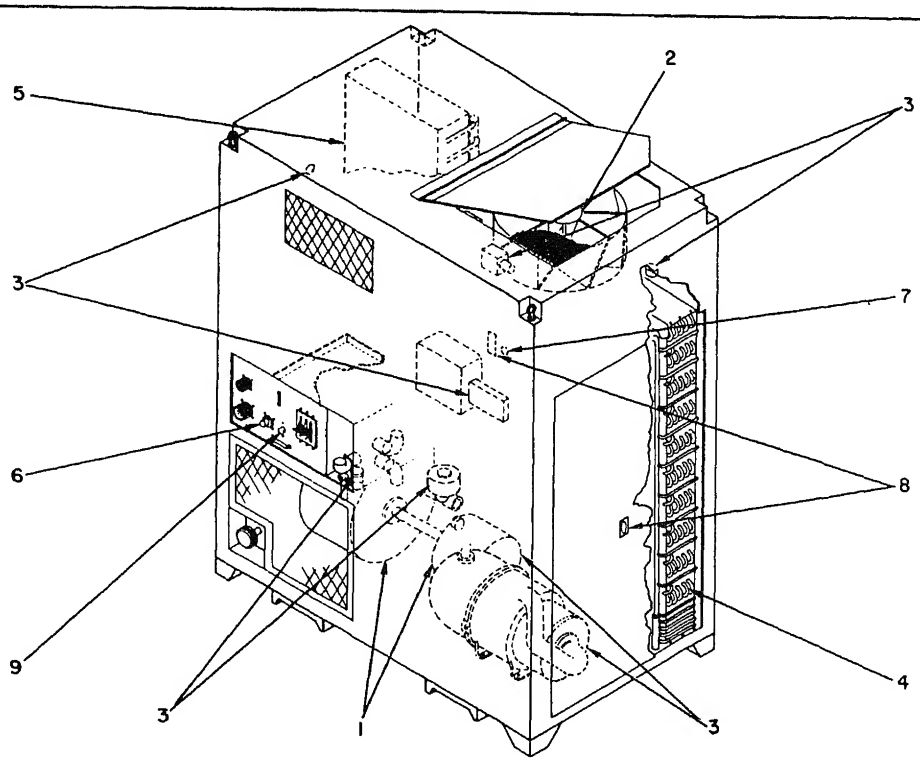
Figure 3-1(1). Daily preventive maintenance services.

ITEM		PAR REF
3	FUSE. Inspect the fuse holder. If the indicator light is glowing, fuse is defective. Replace a defective fuse.	2-9. b. (4) 3-9.
4	CONTROLS AND INSTRUMENTS. Inspect for damage. With unit operating, inspect for improper operation.	2-10. 2-11. 2-12.
	NOTE 1. MIST ELIMINATOR. The mist eliminator will generally not require servicing as only filtered air reaches it. Also, cleaning the evaporator assembly core (paragraph 3-34) effectively cleans the mist eliminator. NOTE 2. OPERATION. During operation, observe for any unusual noise or vibration. Notify organizational maintenance of erratic operation.	

ME 4120-287-15/3-1 (2)

Figure 3-1(2)—Continued.

PREVENTIVE MAINTENANCE SERVICES
QUARTERLY



ITEM		PAR REF
1	EVAPORATOR FAN MOTOR. Inspect for damage and freedom of movement.	6-11.
2	CONDENSER FAN MOTOR. Inspect for damage and freedom of movement.	6-11.
3	ELECTRICAL WIRING. Inspect the wiring for loose connections and cracked insulation.	2-3. a. (2), (3), (6)
4	CONDENSER. Inspect for leaks, corrosion, dust and dirt.	3-10. 5-21.

ME 4120-287-15/3-2 (1)

Figure 3-2 (1). Quarterly preventive maintenance services.

ITEM		PAR REF
5	EVAPORATOR. Inspect for leaks, corrosion, dust and dirt.	3-11. 5-21. 5-20.
6.	FUSE. Inspect the fuse holder. If the indicator light is flowing, fuse is defective. Replace a defective fuse.	2-9. b. (4) 3-37.
7	REFRIGERANT LIQUID SIGHT GLASS. Inspect the refrigerant liquid sight glass while the unit is operating. Milky flow indicates moisture in the refrigerant system; bubbles indicate low charge.	2-9. c. (1) 5-19. 5-21. 5-20.
8	FILTER CLEAN INDICATORS. Inspect the filter clean indicators while the air conditioner is operating. Clean or replace the evaporator and/or condenser air inlet filter when indicator ball rises to SERVICE position.	2-9. c. (2) 2-9. c. (3) 3-32. 3-33. 3-34. 3-35.
9	CONTROLS AND INSTRUMENTS. Inspect for damage. With air conditioner operating, inspect for improper operation.	2-10. 2-11. 2-12.
	NOTE 1. OPERATIONAL TEST. During operational test, observe for any unusual noise or vibration.	

ME 4120-287-15/3-2 (2)

Figure 3-2 (2)—Continued.

Section IV. OPERATOR'S MAINTENANCE

3-8. General

Instructions in this section are published for the information and guidance of the operator to maintain the air conditioner.

3-9. Fuse Replacement

When the fuse holder indicator lights, refer to figure 3-3 and replace the fuse.

3-10. Condenser Air Inlet Filter Service

Refer to figure 3-4 and service the condenser air inlet filter.

3-11. Evaporator Air Inlet Filter Service

Refer to figure 3-5 and service the evaporator air inlet filter.

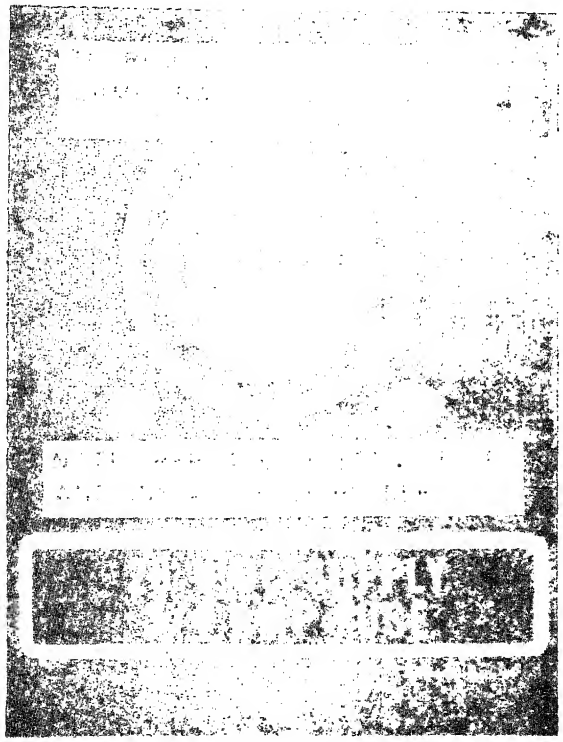


Figure 3-3. Fuse replacement.

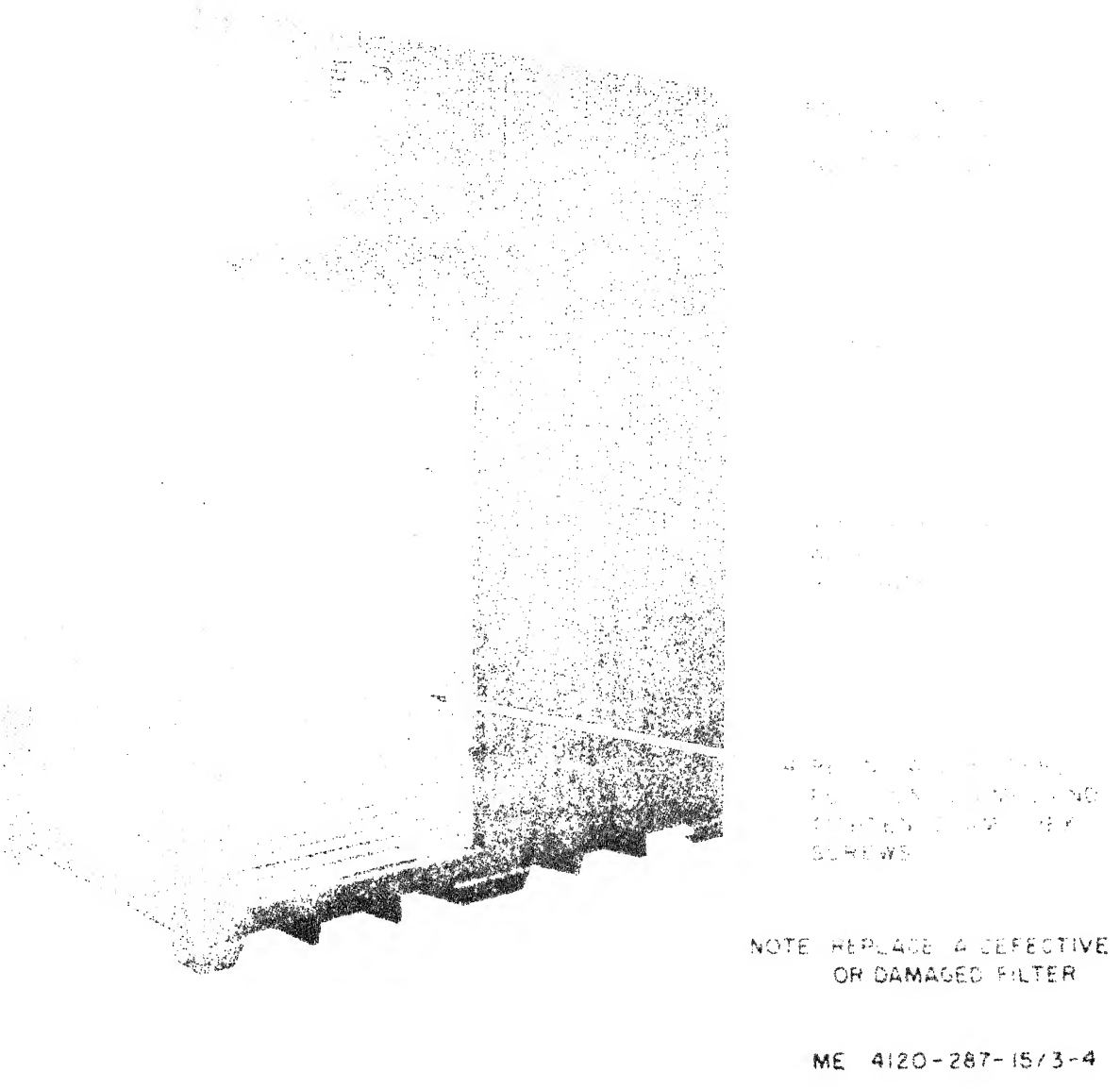


Figure 3-4. Condenser air inlet filter service.

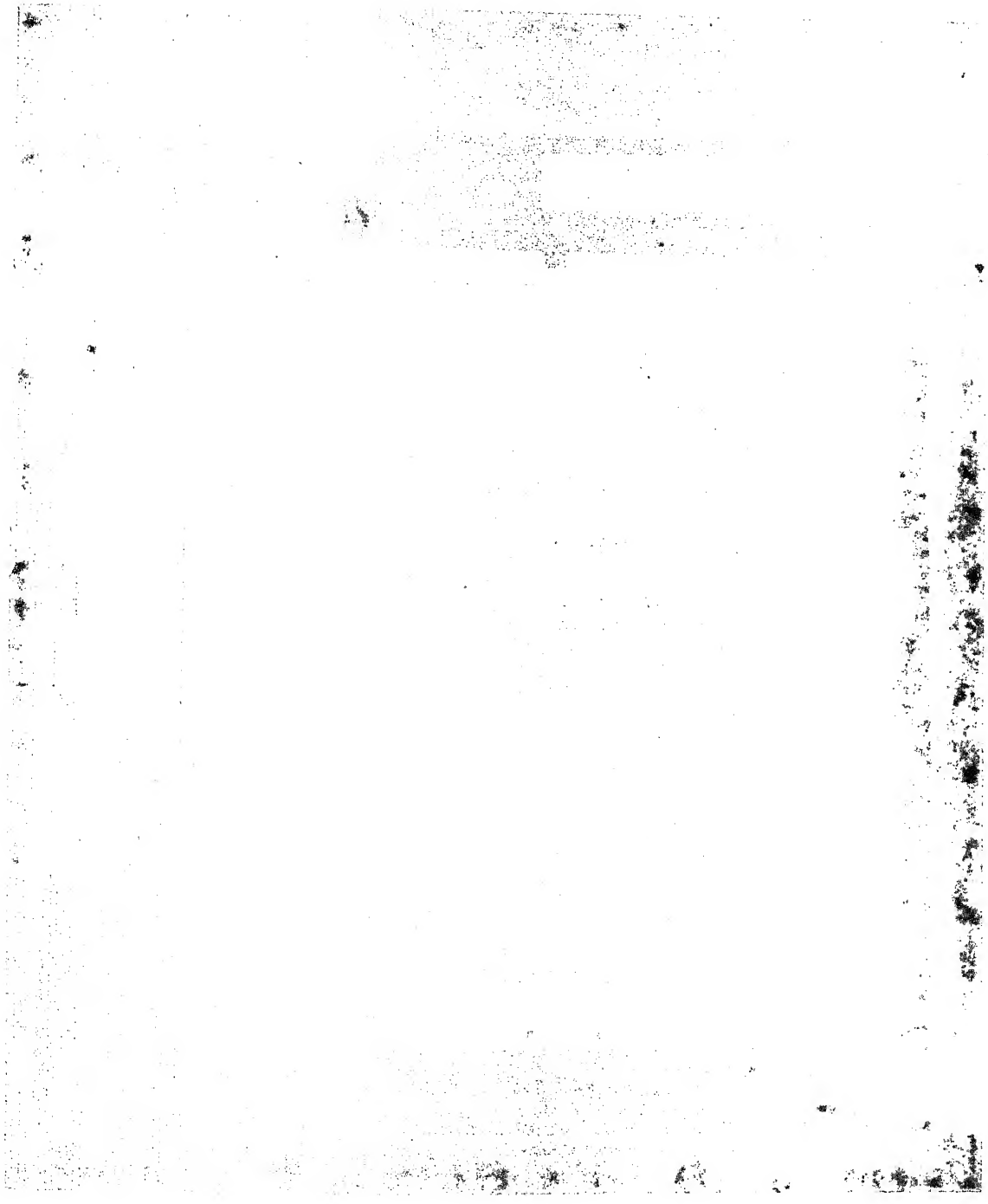


Figure 3-5. Evaporator air inlet filter service.

Section V. TROUBLESHOOTING

3-12. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner and its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable causes. Any trouble beyond the scope of organizational maintenance shall be reported to direct support maintenance.

3-13. Air Conditioner Fails to Start

No operation in any control position.

Probable cause	Possible remedy
Interrupted power supply	Check line side of power cable. If not reading, check main power supply.
Main power cable not properly secured, or cable damaged.	Check power input cable and check (J101 and P101) for continuity and positive connection.
Fuse blown	Replace fuse (para 3-9).
Power supply out of phase.	Correct phasing of power supply (para 2-4a(6)).

3-14. Insufficient Cooling

Air conditioner operating with air conditioning switch in COOL position.

Probable cause	Possible remedy
Remote control box temperature control variable resistor set above ambient.	Move variable resistor further down the scale toward COOL position.
Condenser assembly, or inlet filter obstructing air flow.	Check condenser section filter clean indicator; service condenser assembly and inlet filter as required (para 3-33, and 3-35).
Evaporator air inlet filter obstructing air flow.	Check evaporator filter clean indicator; service evaporator assembly and inlet filter as required (para 3-32 and 3-34).
Low refrigerant-12 charge.	Check refrigerant liquid sight indicator; notify direct support maintenance if flow through indicator appears milky or contains bubbles (para 2-9c(1)).
Compressor and/or condenser drive motors shut down.	Allow a few minutes for motor windings to cool down; then press system reset switch.
Condenser or evaporator fan motors shut down.	Internal motor overload relay tripped. Motor will start up automatically when cooled. Notify direct support maintenance if motor does not restart in a few minutes.
Defective thermostat	Replace thermostat (para 3-39).
Defective remote control	Replace remote control box assembly and/or wiring harness.

3-15. Air Conditioner Stops

Probable cause	Possible remedy
Power failure	Inspect power source cable for defects or external power source for proper operation.
Fuse blown	Replace fuse (para 3-9).
Master circuit breaker tripped.	Set master circuit breaker to OFF position; after a few minutes set to ON position. If air conditioner does not start notify direct support maintenance.
Trip relay K101 energized	Press system reset switch.

3-16. Compressor Noisy

Probable cause	Possible remedy
Insufficient oil or refrigerant supply, or defective compressor.	Notify direct support maintenance.

3-17. Compressor Stops

Probable cause	Possible remedy
Condenser or condenser air inlet filter-dirty.	Check condenser section filter clean indicator; service or replace filter and clean condenser and sub-cooler assembly as required (para 3-33).
Air in refrigerant system	Check refrigerant liquid sight indicator; if refrigerant flow appears milky or contains bubbles notify direct support maintenance.

3–18. Excessive Cooling

Probable cause	Possible remedy
mperature control ariable resistor set too ow.	Adjust variable resistor for higher temperature.
ermostat defective	Replace thermostat (para 3–39).

3–19. Excessive Heating

Probable cause	Possible remedy
nperature control ariable resistor set too igh.	Adjust variable resistor for lower temperature.
ermostat defective	Replace thermostat (para 3–39).

3–20. No Temperature Regulation in any Control Position

Probable cause	Possible remedy
Thermostat faulty	Replace thermostat (para 3–39).
Temperature control variable resistor (located in remote control box) defective.	Replace temperature contr variable resistor.
Defective remote control box wiring harness.	Replace wiring harness connecting remote control box assembly to electrical tray panel (para 3–41).

Section VI. HOUSING PANELS

21. General

e air conditioner is enclosed with sheet minum panels mounted to the frame with her quarter-turn stud fasteners, or phillip- ıd bolts. Evaporator section housing panels insulated with layers of sponge rubber ce- nted directly to the interior face of the ıels. All panel contact edges are sealed with ontinuous strip of ribbed gasket material. e air inlets and outlets have removable ex- ıded metal screens spot-welded to their re- ctive panel assemblies.

22. General Maintenance Procedures

e following procedures pertain to all panel emblies installed on the air conditioner. ocedures peculiar to a particular panel as- ıbly are included within the paragraph ling with that panel assembly.

***Caution:* Before removing or installing any nel assembly disconnect the power source m the air conditioner.**

. *Cleaning.* Clean all parts with an ap- ved cleaning solvent.

. *Inspection.*

(1) Inspect the panel assembly for dents, cks, and other signs of structural damage.

(2) Inspect insulation and gaskets for se- ity, damage, and deterioration.

(3) Check the stud fasteners for broken, t, or missing cross pins, washers, springs, seals.

(4) Inspect the panel assembly for chipped and worn paint.

c. Repair and Replacement.

(1) Panel assemblies. Repair or replace a damaged panel assembly if the damage is such that the assembly does not seal properly against the frame assembly; permitting the air conditioner interior to be contaminated by foreign matter or the elements. Refer damage beyond scope of organizational maintenance to direct support maintenance.

(2) Insulation and Gaskets. Panel assemblies which have damaged insulation and/or gaskets must be repaired, see maintenance allocation chart for scope of organizational maintenance. If the insulation or gasket is loose, it can be fastened with cement, MIL Spec MIL–C–4003.

(3) Quarter-turn fastener assembly. Replace damaged stud fasteners (fig. 3–6) as follows:

(*a*) Compress the stud fastener and remove it from the panel grommet assembly.

(*b*) Remove the stud assembly seal from the stud fastener grommet.

(*c*) Install a new seal on the stud assembly spring cup.

(*d*) Compress the stud fastener and install it in the panel grommet assembly.

(4) Repaint worn, chipped, or peeling paint as follows:

(*a*) Remove loose paint with a wire brush.

(*b*) Clean the area to be repainted.

(*c*) Paint the area with zinc chromate primer, MIL Spec MIL–P–6889A, type I.

(*d*) After the primer dries, paint with one coat of semi-gloss olive drab per MIL Spec MIL–T–704, Type A. Color to be in accordance with Federal Specification TT–E–485C, Type II, Color Number X24087.

3–23. Evaporator Left-side Access Panel Assembly

a. Removal. Remove the eighteen phillips head screws (8, fig. 3–7) securing the panel assembly (5) to the cabinet; then remove the panel assembly from the air conditioner frame.

b. Inspection, Cleaning, Repair and Replacement. Perform the applicable procedures of paragraph 3–22.

c. Installation. Secure the panel assembly (5) to the air conditioner frame with the phillips head screws (8).

3–24. Evaporator Blower Access Panel Assembly

a. Removal. Remove the eighteen phillips head screws (4, fig. 3–7) securing the panel assembly (1) to the cabinet; then remove the panel assembly from the air conditioner frame.

b. Inspection, Cleaning, Repair and Replacement. Perform the applicable procedures of paragraph 3–22.

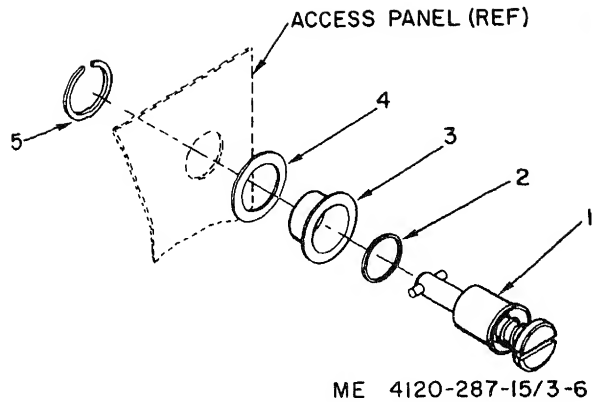
c. Installation. Secure the panel (1) to the air conditioner frame with the phillips head screws (4).

3–25. Electrical Tray Access Panel Assembly

a. Removal. Remove the twelve phillips head screws (11, fig. 3–7) securing the panel assembly (9) to the cabinet; then remove the panel assembly from the air conditioner frame.

b. Inspection, Cleaning, Repair and Replacement. Perform the applicable procedures of paragraph 3–22.

c. Installation. Secure the panel assembly (5) to the air conditioner frame with the phillips head screws (11).



1 Stud assembly
2 Preformed packing
3 Grommet
4 Washer
5 Snap ring

Figure 3–6. Quarter-turn fastener assembly.

3–26. Thermostat Access Panel

a. Removal

(1) Remove the electrical tray access panel according to paragraph 3–25*a*.

(2) Remove the seven phillips head screws (13, fig. 3–7) securing the thermostat access panel (12) to the cabinet; then remove the thermostat access panel from the air conditioner frame.

b. Inspection, Cleaning, Repair and Replacement. Perform the applicable procedures of paragraph 3–22.

c. Installation. Secure the panel (12) to the air conditioner frame, using the phillips head bolts (13).

3–27. Evaporator Rear Access Panel

a. Removal. Loosen the panel's twenty quarter-turn fasteners by depressing fasteners and rotating one-quarter turn counterclockwise; then remove the panel assembly (7, fig. 3–8) from the air conditioner frame.

b. Inspection, Cleaning, Repair and Replacement. Perform the applicable procedures of paragraph 3–22.

c. Installation. Secure the panel (7, fig. 3–8) to the air conditioner frame with the quarter-turn fasteners.

3-28. Condenser Air Inlet Weather Cover

a. Removal. Remove the three phillips head screws (9, fig. 3-8) securing the weather cover 8) to the air conditioner frame; then remove the weather cover.

b. Inspection, Cleaning, Repair and Replacement.

(1) Perform the applicable procedures of paragraph 3-22.

(2) Replace weather cover when material thins due to weathering.

(3) Small tears may be patched with canvas until a new cover can be obtained.

c. Installation. Secure the weather cover (8, fig. 3-8) to the air conditioner frame with phillips head screws (9).

3-29. Condenser Right-side Access Panel Assembly

a. Removal. Loosen the panel's twenty-eight quarter-turn fasteners by depressing fasteners and rotating one quarter-turn counterclockwise; then remove panel assembly (1, fig. 3-8) from the air conditioner frame.

b. Inspection, Cleaning, Repair and Replacement. Perform the applicable procedures of paragraph 3-22.

c. Installation. Secure the panel assembly (1, fig. 3-8) to the air conditioner frame with the quarter-turn fasteners.

3-30. Condenser Air Discharge Door Assembly

a. Removal. Remove the hinge pin (6, fig. 3-8) from the condenser door hinge.
Loosen the door's four quarter-turn fasteners by depressing fasteners and rotating one-quarter turn counterclockwise; then remove the door (5, fig. 3-8) from the air conditioner.

Note. Do not remove condenser air discharge door assembly unless repairing or replacing door. Sufficient access is gained to components beneath door by loosening the four quarter-turn fasteners and opening door.

b. Inspection, Cleaning, Repair and Replacement.

(1) Perform the applicable procedures of paragraph 3-22.

(2) Inspect the door hinges for damage and security. Inspect the hinge area for defective spot welds.

(3) Inspect the honeycomb assembly for damage and security.

c. Installation.

(1) Secure the door (5, fig. 3-8) to the air conditioner frame with quarter-turn fasteners.

(2) Replace condenser door hinge pin (6, fig. 3-8) if it was removed.

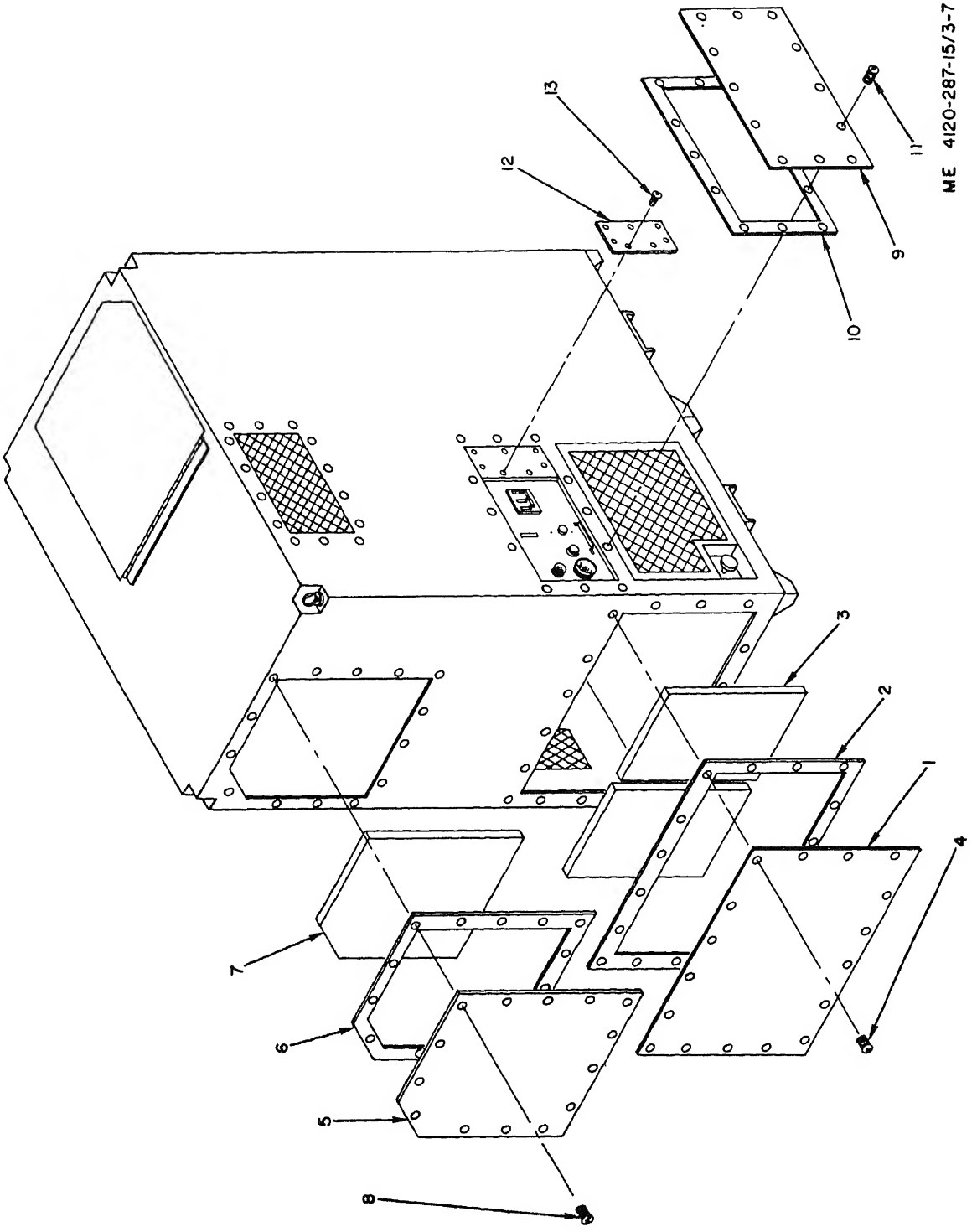
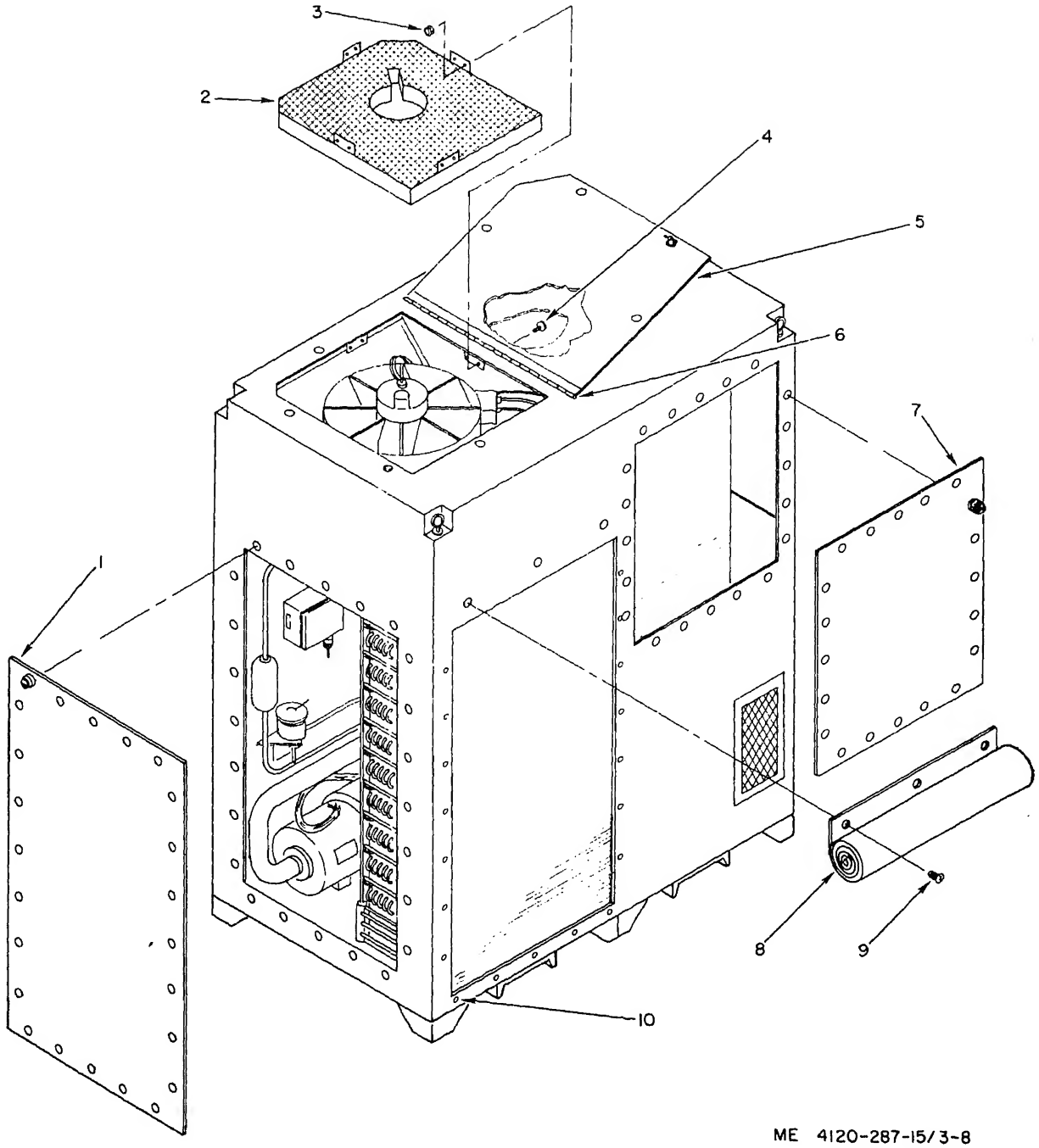


Figure 3-7. Front and left-side panel assemblies, exploded view.

1 Evaporator blower left-side access panel
2 Gasket
3 Insulation
4 Phillips screw (18)
5 Evaporator left-side access panel
6 Gasket
7 Insulation
8 Phillips screw (18)
9 Electrical tray access panel
10 Gasket
11 Phillips screw (12)
12 Thermostat access panel
13 Phillips screw (7)

Figure 3–7—Continued.



1 Condenser right-side access panel assembly
2 Honeycomb
3 Nut (8)
4 Screw (8)
5 Condenser air discharge door assembly
6 Hinge pin
7 Evaporator rear access panel assembly
8 Condenser air inlet weather cover assembly
9 Screw (3)
10 Snap fastener button (19)

Figure 3-8. Air conditioner right-side and rear panel assemblies and top door assembly, exploded view.

Section VII. AIR CIRCULATION SYSTEM

3-31. General

a. Operator and Organizational Maintenance Services. Operator and organizational maintenance of the air circulation system is limited to cleaning the evaporator and condenser assemble core fins, cleaning or replacing the evaporator and condenser section inlet air filters, and maintaining the evaporator outlet duct assembly.

b. Evaporator Section. The evaporator blower (fan) circulation system is integral with the evaporator recirculating air intake and conditioned air delivery ductwork. The delivery side of the blower distributes cooled, heated, or ambient recirculating air to the shelter area as determined by the mode in which the air conditioner is operating.

The total evaporator blower discharge (delivered) air flow passes through the evaporator inlet air filter before being conditioned and passed on to the conditioned air duct leading into the shelter.

c. Condenser Section. The condenser circulation fan, located in the top of the condenser section, exhausts warm air from the condenser assembly enclosure; thus drawing outdoor ambient air through the condenser inlet filter. The condenser inlet air filter protects the condenser and subcooler assembly core fins, and various other vapor cycle components located in the condenser section from dirt and foreign parbicles.

d. Filter Clean Indicator. The filter clean indicators measure the air flow through the air filters. When air flow through either the condenser or evaporator section is restricted sufficiently to affect air conditioning capacity the filter clean indicator ball rises to the SERVICE pointer. When a service condition exists the effected air filter and/or core assembly must be serviced.

3-32. Evaporator Air Inlet Filter

a. Removal.

(1) Remove the evaporator rear access panel assembly (para 3-27*a*).

(2) Remove the three air filter retaining clip hex nut fasteners (fig. 3-5); then remove the air filter retaining clips.

(3) Remove the air filter from the evaporator section air conditioner frame assembly.

b. Cleaning, Inspection, and Replacement.

(1) Clean the air filter with an approved cleaning solvent; and dry with compressed air.

(2) Inspect the air filter for cracks, breaks, and distortion. Replace a damaged air filter.

(3) Inspect the air filter retaining clips and hex nut fasteners for serviceability. Replace defective clips.

c. Installation.

(1) Position the air filter in the air conditioner evaporator section (fig. 3-5).

(2) Place the three air filter retaining clips in position against the air filter and tighten the three hex nut fasteners.

(3) Install the evaporator rear access panel assembly (para 3-27).

3-33. Condenser Air Inlet Filter

a. Removal.

(1) Roll up and tie the condenser air inlet weather cover to provide unobstructed access to the air filter.

(2) Remove the six air filter retaining clip hex nut fasteners (fig. 3-4); then remove the air filter retaining clips.

(3) Remove the air filter from the condenser section air conditioner frame assembly.

b. Cleaning, Inspection, and Replacement.

(1) Clean the air filter with an approved cleaning solvent; and dry with compressed air.

(2) Inspect the air filter for cracks, breaks, and distortion. Replace a damaged air filter.

(3) Inspect the air filter retaining clips and hex nut fasteners for serviceability. Replace defective clips.

c. Installation.

(1) Position the air filter in the air conditioner condenser section (fig. 3-4).

(2) Place the six air filter retaining clips in position against the air filter and tighten the six hex nut clip fasteners.

(3) Roll down condenser air inlet weather cover; then using the snap fasteners (fig. 3-4) secure weather cover to air conditioner frame.

3-34. Evaporator Assembly

a. Remove the evaporator rear access panel and air inlet filter (para 3-22*a*).

b. Clean the core fins of the evaporator assembly with compressed air.

c. Install the air filter and evaporator rear access panel (para 3-32*c*).

3-35. Condenser Assembly

a. Roll up condenser air inlet weather cover and remove air inlet filter (para 3-33a).

b. Remove the condenser right-side access panel assembly (para 3-9*a*).

c. Clean the accumulated dust and dirt from the core fins of the condenser assembly and the subcooler assembly with compressed air.

d. Install the condenser right-side access panel assembly (para 3-25*c*).

e. Install the air inlet filter and secure the weather cover to the air conditioner frame (para 3-33*c*).

Section VIII. AIR CONDITIONER ELECTRICAL SYSTEM

3-36. General

Operator and organizational maintenance of the electrical system consists of replacing the fuse, fuse holder, remote control box, variable resistor, switch, harness assembly, and temperature control thermostat.

3-37. Electrical Tray Panel Fuse

a. Removal.

Note. If the lamp in the fuse holder (fig. 3-3) glows, it indicates that the fuse is blown and must be replaced.

(1) Push inward on fuse holder (fig. 3-3) and rotate it counterclockwise. Remove the fuse and the fuse holder.

(2) Remove fuse from fuse holder.

b. Cleaning, Inspection, and Testing.

(1) Wipe the fuse holder and fuse clean with a dry cloth.

(2) Inspect the fuse holder for cracks and distortion. Test the fuse for continuity with a test lamp. Replace an unserviceable fuse or fuse holder.

c. Installation. Insert fuse holder (fig. 3-3) with a 3/4 ampere 600 volt fuse installed, into the electrical tray panel. Press the fuse holder and turn it clockwise to secure it in position.

3-38. Remote Control Box Assembly and Wiring Harness

a. Removal.

(1) See that the main power source is disconnected.

(2) Disconnect wiring harness from remote control box assembly (J103) and from electrical tray remote control receptacle (J102).

b. Cleaning, Inspection, and Repair.

(1) Wipe the wiring harness assembly and the box assembly with a clean, dry cloth (fig. 2-2).

(2) Inspect the wiring harness assembly for frayed or defective insulation and for loose or broken terminals.

(3) Inspect the box assembly for cracks, a defective switch, and for loose or missing hardware.

(4) Repair or replace an unserviceable wiring harness assembly.

(5) Replace a damaged or unserviceable remote control box assembly.

c. Installation.

(1) Connect remote control wiring harness plug (P103) to remote control bolt assembly receptacle (J103).

(2) Connect remote control wiring harness plug (P102) to electrical panel *remote.* Control receptacle (J102).

(3) Connect main power supply plug (P101) to electrical tray panel power input receptacle (J101).

3-39. Thermostat

a. Removal.

(1) Remove the thermostat access panel (para 3-26*a*).

(2) Loosen terminal board (TB2) lug screws 1, 2, and 3 (2, 3 and 4, fig. 3–9); and remove thermostat leads from terminal board.

(3) Remove the two thermostat hold down phillip screws (6) by turning counterclockwise; then remove the thermostat (5) from the air conditioner frame.

b. Cleaning, Inspection, and Replacement.

(1) Wipe the thermostat, thermostat leads, and terminal board with a clean, dry cloth.

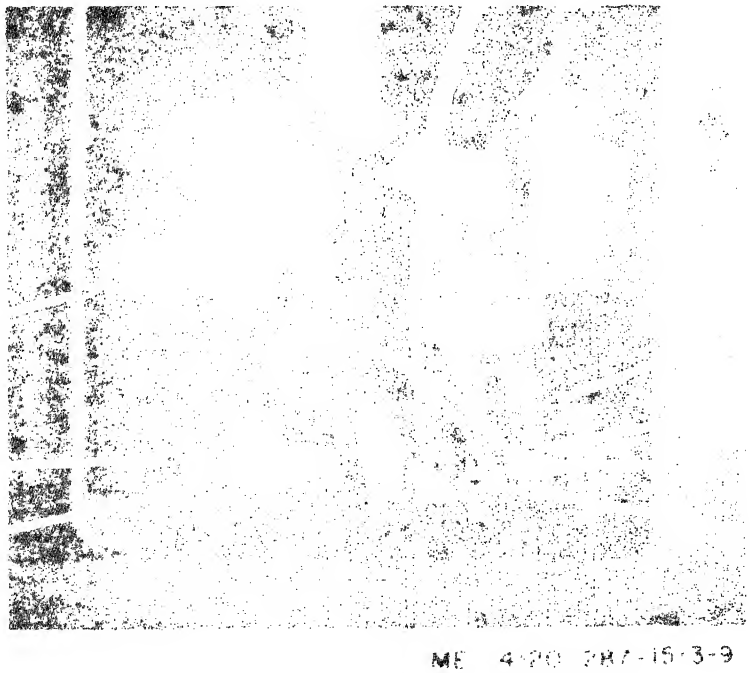
(2) Inspect the thermostat for cracks, breaks, and distortion. Check for integrity of thermostat lead insulation. Replace a defective thermostat.

c. Installation.

(1) Install thermostat (5, fig. 3–9) using the two phillips head screws (6).

(2) Connect thermostat black, red, and white leads to terminal board TB2 connectors 1, 2, and 3 (4, 3, and 2, fig. 3–9) respectively.

(3) Install thermostat access panel (para 3–26*c*).



1 Terminal board TB–2
2 White thermostat lead
3 Red thermostat lead
4 Black thermostat lead
5 Thermostat
6 Phillips head bolt (2)
7 Arbor nut plate (7)

Figure 3–9. Thermostat replacement.

Section IX. TEMPERATURE CONTROL SYSTEM

3–40. General

The temperature control system consists of the remote control box containing the air conditioning switch (para 2–8*a*) and temperature control variable resistor (para 2–8*a*), current limiting resistor, cycling resistor, cycling capacitor, temperature control relay and the temperature control thermostat.

3-41. Remote Control Box Wiring Harness

a. Removal.

(1) Make sure input power plug P101 is disconnected from electrical tray panel input power receptacle J101.

(2) Disconnect remote control box harness from the remote control box and from the electrical tray panel remote control receptacle.

b. Inspection and Testing.

(1) Inspect remote control box harness assembly for physical defects in accordance with paragraph 3-38*b*. Replace a defective harness assembly.

(2) Test for electrical defects as follows:

(*a*) Using a multimeter or test lamp, test for continuity of individual harness wires by placing one test lead on harness plug P102, prong A; and the other test lead on plug P103, prong A. Continue testing P102 and P103 positions B, C, D, E, F, G, H, J, K, and L, in this manner. Make sure that the test leads are on plug P102's and P103's associated prongs (A–A, B–B, C–C thru L–L) while observing for multimeter needle deflection or test lamp glow. Replace the remote control harness assembly should the multimeter or test lamp indicate discontinuity in one or more of the above tests.

c. Installation.

(1) Connect the harness to the remote control box and electrical tray panel remote control receptacle.

(2) Connect input power plug P101 to electrical tray panel input power receptacle J101.

CHAPTER 4

DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE INSTRUCTIONS

Section I. GENERAL

4–1. Scope

These instructions are published for the use of direct and general support and depot maintenance personnel maintaining the air conditioner. They provide information on the maintenance of the equipment, which is beyond the scope of tools, equipment, personnel, or supplies normally available to using organizations.

4–2. Record and Report Forms

For other record and report forms applicable to direct and general support and depot maintenance, refer to TM 38–750.

Note. Applicable forms, excluding Standard Form 46 which is carried by operator, shall be kept in a canvas bag mounted on equipment.

Section II. DESCRIPTION AND TABULATED DATA

4–3. Description

For a complete description of the air conditioner see paragraph 1–3.

4–4. Tabulated Data

Refer to paragraph 1–4*b* for tabulated data.

CHAPTER 5

GENERAL MAINTENANCE INSTRUCTIONS

Section I. SPECIAL TOOLS AND EQUIPMENT

5-1. Special Tools and Equipment

No special equipment is required by direct and general support and depot maintenance personnel for performing maintenance on the air conditioner.

5-2. Specially Designed Tools and Equipment

No specially designed tools or equipment are required by direct and general support and depot maintenance personnel for performing maintenance on the air conditioner.

Section II. TROUBLESHOOTING

5-3. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the air conditioner or any of its components. Each trouble symptom stated is followed by a list of probable causes. The possible remedy recommended is described opposite the probable cause.

5-4. Unit Inoperative (No operation in any control position)

Probable Cause	Possible Remedy
Fuse F1 blown, or no fuse in 28 VDC circuit.	Check fuse for continuity; replace if necessary (para 3-37). Recurrent fuse failure indicates a short in 28VDC circuit. Check wiring for continuity and shorts. (para 6-9*b*(1)).
Trip relay K101 tripped (energized).	Press system reset switch. Restart according to paragraph 2-10. Check trip relay (para 6-9*c*(1)).
Main power cable not properly secured, or cable damaged.	Check power input cable and connector (J101 and P101) for continuity and positive connection.
Interrupted power supply	Check line side of power cable; if not reading check main power supply.
Remote control cable not properly secured, or cable damaged.	Check cable connectors J102 and J103 for continuity and positive connection.
Remote control box inoperative.	Check temperature control switch and air conditioning switch repair or replace control box as necessary (para 6-1 through 6-4).
Master circuit breaker (CB1) defective.	Check circuit breaker; replace if necessary (para 6-9*a*).
Defective silicon rectifier (CR1).	Check rectifier for opens, shorts and proper output; replace if necessary (para 6-9*b*(4)).
Power supply connected out of phase.	Check phase; correct as necessary (para 2-4*a*(8)).
Defective power transformer (T1).	Check transformer for opens, shorts and proper output; replace if necessary (para 6-9*b*(3)).
No primary input at power transformer.	Phase sequence relay (K108) defective, or wrong relay installed. Check relay; replace as necessary (para 6-9*b*(2)).

5-5. Air Conditioner Stops

Probable Cause	Possible Remedy
Refer to probable cause column of paragraph 5-4.	Refer to possible remedy column of paragraph 5-4.

5-6. No (or insufficient) Heating

Probable Cause	Possible Remedy
Temperature control variable resistor set below ambient.	Turn variable resistor knob toward WARM.
Refer to probable cause column of paragraph 5-4.	Refer to possible remedy column of paragraph 5-4.
Defective or damaged thermostat (S105).	Substitute new component in place of suspected faulty thermostat (para 6-6*e*).
Heater line contactor relay (K107) defective.	Checkline contactor relay; replace if defective (para 6-9*c*(4)).
Defective temperature control relay (K103).	Substitute new component in place of suspected faulty thermo relay. (para 6-9*c*(3)).
Heater temperature switch (S104) defective.	With ambient temperature below 125°F, check terminal B and D of plug P112 for continuity. Replace switch S104 if defective. If heaters cut-out bellow 125°F substitute new component for S104 (para 6-6*d*).
Evaporator blower not functioning, causing S104 to trip.	Check evaporator blower line contactor relay (K106); replace if defective (para 6-9*c*(4)).
Current limiting fixed resistor (R1) shorted, causing K103 coil to energize at excessively low temperatures—cutting off heaters.	Check resistor R1 for open or short condition. Check for 350 ohms resistance across R1; replace resistor R1 if defective (para 6-10, and fig. 1-9).

5-7. No (or insufficient) Cooling

Probable Cause	Possible Remedy
Condenser discharge door closed, or defective microswitch (S101).	Open condenser door, make sure microswitch is operative; replace a defective microswitch (para 6-6*a*).
Condenser-subcooler assembly core and/or filter dirty.	Check condenser filter clean indicator; service as required (para 3-33 and 3-35).
Evaporator assembly core and/or filter dirty.	Check evaporator filter clean indicator; service as required (para 3-32 and 3-34).
Low refrigerant charge	Check refrigerant charge level (para 2-8*c*(1)). If necessary, add refrigerant-12 to system (para 7-5).
Condenser or evaporator motor internal overload relay tripped.	Motor re-starts automatically when cooled. No action necessary. If condition recurrs frequently, determine cause and correct. Test motors as necessary (para 6-13).
Defective evaporator fan line contactor relay (K106).	Check line contactor relay. Replace if necessary (para 6-9*c*(4)).
Defective condenser fan line contactor relay (K105).	Check line contactor relay. Replace if necessary (para 6-9*c*(4)).
Defective compressor motor line contactor relay (K104).	Check line contactor relay. Replace if necessary (para 6-9*c*(4)).
Defective time delay relay (K102).	Check time relay (K102); replace if defective (para 6-9*c*(2)).
Current limiting fixed resistor (R1) open, preventing temperature control relay (K103) coil from energizing.	Check R1 for open or short condition and for 350 ohm value. Replace resistor R1 if defective (para 6-10, and fig. 1-9).
Temperature control variable resistor defective.	Check R3 (fig. 1-9) for open or short condition and resistance range. Replace if defective (para 6-3*a*).
Defective or damaged thermostat (S105).	Replace thermostat (para 3-39).
Defective motor compressor.	Refer to paragraphs 6-12*c*, 6-13, and 6-14*c*.
Defective condenser fan	Refer to paragraphs 6-12*b*, and 6-14*b*.
Defective evaporator blower.	Refer to paragraphs 6-12*a*, 6-13, and 6-14*a*.
Defective refrigerant solenoid valve coil (L101) or no voltage applied to coil.	Check coil (L101). Check for 28vdc across terminals N and P of jack J108. Replace a defective coil (para 6-6*f*).
Defective solenoid valve	Check sight glass for refrigerant flow (para 2-8*c*(1)). Check to see if tubing near valve outlet is cooler than tubing adjacent to inlet (indicating partially blocked valve) (para 7-8).
Low ambient switch (S102) defective, causing trip relay K101 to maintain tripped condition.	Check lines 109 and 111 for open condition. Replace S102 if defective (para 6-6*b*).

	7–8 and 7–15*a*).
Defective thermoexpansion valve.	Replace thermoexpansion valve (para 7–21).
Defective hot gas bypass valve.	Replace bypass valve (para 7–20).
Defective liquid quench valve.	Replace quench valve (para 7–19).
Defective charge valve	Replace charge valve. (para 7–14 and 7–16).
Defective pressure relief valve.	Replace pressure relief valve (para 7–15).
Defective evaporator	Replace evaporator (para 5–27).
Defective condenser-subcooler assembly.	Replace condenser-subcooler assembly (para 5–24).

5–8. Excessive Cooling

Probable Cause	Possible Remedy
Defective thermostat (S105).	Check thermostat. Replace if necessary (para 3–39 and 6–6*e*).
Defective liquid refrigerant solenoid valve. Solenoid valve passes refrigerant after coil (L101) is deenergized.	Check for 28vdc across terminals 4 and 5 of terminal board TB1. Disconnect solenoid coil at TB1. Start up air conditioner and observe liquid refrigerant sight glass. If flow is evident, replace solenoid valve (para 7–18).

5–9. Motor Compressor Excesesively Noisy

Probable Cause	Possible Remedy
Defective thermoexpansion valve (allowing liquid carryover).	Replace thermoexpansion valve (para 7–21).
Defective liquid quench valve (allowing liquid carryover).	Replace liquid quench valve (para 7–19).
Defective motor compressor.	Replace motor compressor (para 5–20).

5–10. Motor Compressor and Condenser Fan Inoperative (All other components functioning)

Probable Cause	Possible Remedy
Trip relay K101 tripped (energized).	Press SYSTEM RESET switch (S1) (paragraph 6–9*c*(1)).
Condenser discharge door closed.	Open condenser discharge door.
Remote control harness assembly defective.	Check for continuity between identically marked terminals of plugs P102 and P103. Repair or replace a defective harness (para 3–41*b*).
Low ambient temperature switch closed. High-low pressure switch closed. Compressor thermal overload switch closed.	Isolate faulty switch by continuity check at terminals 1 and 2 of terminal board TB1 (fig. 1–9).
Defective remote control box assembly.	Check remote control box assembly. Replace or repair a defective remote control box assembly (paragraph 6–3).
Defective trip relay (K101).	Check trip relay (K101), replace if defective (para 6–9*c*(1)).

5–11. Motor Compressor Inoperative (All other components functioning)

Probable Cause	Possible Remedy
Defective line contactor relay (K104).	Check contactor; replace if necessary (para 6–9*c*(4)).
Connectors P105 and J105 and/or P113 and J113 and/or motor terminals not properly secured; connector or wiring harness damaged.	Check for security of attachment and integrity of connector. Check harness. Replace a damaged connector or harness assembly.
Defective time delay relay (K102).	Operate air conditioner in cooling mode. After 3 seconds check for 28vdc across relay K104 terminals X1 and X2. Replace a defective time delay relay (para 6–9*c*(2)).
Defective motor compressor.	Replace motor compressor (para 6–12*c*, 6–13, and 6–14*c*).

5–12. Condenser Fan Inoperative (All other components functioning)

Probable Cause	Possible Remedy
Defective line contactor relay (K105).	Check contactor; replace if necessary (para 6–9*c*(4), and 6–10).
Connectors P106 and J106 and/or P108 and J108 and/or P111 not properly secured or connectors damaged.	Check for security of attachment and integrity of connectors. Replace a damaged connector.

Probable Cause	Possible Remedy
Defective condenser fan motor.	Check condenser fan assembly; replace if necessary (para 6-11*b*, 6-13, and 6-14*b*).

5-13. Evaporator Blower Inoperative (All other components functioning)

Probable Cause	Possible Remedy
Defective line contactor relay (K106).	Check contactor; replace if defective (para 6-9*c*(4) and 6-10).
Connectors P107 and J107 and/or P109 and J109 and/or P110 not properly secured; connector, or wiring harness damaged.	Check for security of attachment and integrity of connector. Check harness. Replace or repair a damaged connector or harness assembly.
Defective evaporator blower motor.	Check evaporator blower motor; replace if necessary, (para 6-12*a*, 6-13, and 6-14*a*).

5-14. Trip Relay K101 Recurrently Trips

Probable Cause	Possible Remedy
Defective high-low pressure switch (S103).	Adjust or replace as necessary (para 6-6*c*).
Defective compressor motor thermal overload.	Replace motor compressor assembly (para 5-20).
Defective low ambient temperature switch (S102).	Replace low ambient temperature switch (para 6-6*b*).
Intermittant short between lines 19 and 20.	Check terminal board TB1, connectors' P106, J106, P108 terminals E and D. Replace or repair defective components as necessary (fig. 1-9).
Defective trip relay (K101).	Internal intermittant short across relay K101 terminals 6 and 7. Replace if damaged (para 6-9*c*(1)).

Section III. REFRIGERANT SYSTEM MAINTENANCE

5-15. Precautions When Handling Refrigerant

Although refrigerant-12 is one of the safest refrigerants to handle, it is important that personnel observe the following precautions in handling the refrigerant.

a. Do not discharge refrigerant-12 into areas having exposed flames. A heavy concentration of refrigerant in contact with a live flame produces a gas which is toxic and attacks bright metal surfaces.

b. Do not expose the eyes to the refrigerant. If refrigerant-12 comes in contact with eyes, observe the following instructions.

(1) Do not rub the eye(s).

(2) Arrange at once to take the affected person to an eye specialist.

(3) Put drops of sterile mineral oil into the eyes to remove the excess refrigerant.

(4) Wash the eyes with either a weak solution of boric acid or a sterile salt solution (not to exceed 2 percent sodium chloride).

c. Do not expose the skin to the liquid refrigerant. If the liquid comes in contact with the skin, treat the injury the same as though the skin has been frostbitten or frozen. If a person is overcome in an area which lacks oxygen because of the presence of a high concentration of refrigerant-12, treat the person by applying artificial respiration produced manually or by a pulmotor.

5-16. Refrigerant Service Cylinder Handling Procedures

The following precautions must be observed when handling refrigerant bottles.

a. Do not leave the refrigerant bottle uncapped. All refrigerant bottles are shipped with a metal screw cap to protect the valve and safety plug from damage. Replace the cap after each use of the refrigerant bottles.

b. Do not carry or otherwise transport a refrigerant bottle in the passenger compartment of a vehicle or carrier. Do not expose the refrigerant bottle to radiant heat from the sun because the resulting increase in pressure can cause the safety plug to release or the bottle to burst.

c. Never subject the refrigerant bottle to high temperature when adding refrigerant to the air conditioning system. A bucket of hot water (not over 125°F), or hot wet rags around the bottle provides all the heat required to raise the refrigerant in the bottle to a pressure higher than the pressure in the system when adding refrigerant.

5–17. Checking Refrigerant Charge Level

a. Check the refrigerant liquid sight indicator (para 2–8 *c.* (1)). If the refrigerant system requires additional charge bubbles or a milky flow will be present in the refrigerant liquid sight indicator.

b. Operate the air conditioner for approximately 5 minutes. If the bubbles or milky flow in the refrigerant liquid sight indicator are not eliminated, add refrigerant in accordance with paragraph 7–5.

Section IV. REMOVAL AND INSTALLATION OF MAJOR COMPONENTS

5–18. General

Procedures necessary for the removal and installation of all major units are described and illustrated in this section. The following major components are discussed:

a. Electrical tray assembly (para 1–3 *b*).
b. Motor compressor (para 1–3 *d*).
c. Condenser fan assembly (para 1–3 *g*).
d. Evaporator blower (para 1–3 *q*).
e. Evaporator blower motor (para 1–3 *q*).
f. Condenser-subcooler assembly (para 1–3 *h*).
g. Heater assemblies (para 1–3 *t*).
h. Mist eliminator (para 1–3 *u*).
i. Evaporator assembly (para 1–3 *p*).

5–19. Electrical Tray Assembly

a. Removal.

(1) Remove electrical tray access panel assembly (para 3–25*a*).

(2) Refer to figure 5–1 and remove the electrical tray assembly.

b. Installation.

(1) Refer to figure 5–1 and install electrical tray assembly by performing steps in reverse order.

(2) Inspect and install electrical tray access panel assembly (para 3–25 *b* and *c*).

5–20. Motor Compressor

a. Removal.

(1) Remove air conditioner right-side access panel assembly (para 3–29 *a*).

(2) Discharge refrigerant system (para 7–7).

(3) Refer to figure 5–2 and remove the motor compressor.

b. Installation.

(1) Refer to figure 5–2 and install the motor compressor by repeating the steps in reverse order.

(2) Charge the refrigerant system (para 7–8 and 7–9).

(3) Install air conditioner right-side access panel (para 3–29 *b* and *c*).

5–21. Condenser Fan Assembly

a. Removal. Refer to figure 5–3 and remove the condenser motor fan assembly.

b. Installation. Refer to figure 5–3 and install the condenser motor fan assembly by performing steps in reverse order.

5–22. Evaporator Blower

a. Removal.

(1) Remove evaporator blower left-side access panel assembly (para 3–24 *a*).

(2) Refer to figure 5–4 and remove the evaporator blower motor.

b. Installation.

(1) Refer to figure 5–4 and install evaporator blower by performing steps in reverse order.

(2) Install evaporator blower left-side access panel assembly (para 3–24 *b* and *c*).

5–23. Evaporator Blower Motor

a. Removal.

(1) Refer to figure 5–5 and remove evaporator blower motor.

b. Installation. Refer to figure 5–5 and install evaporator blower motor by performing steps in reverse order.

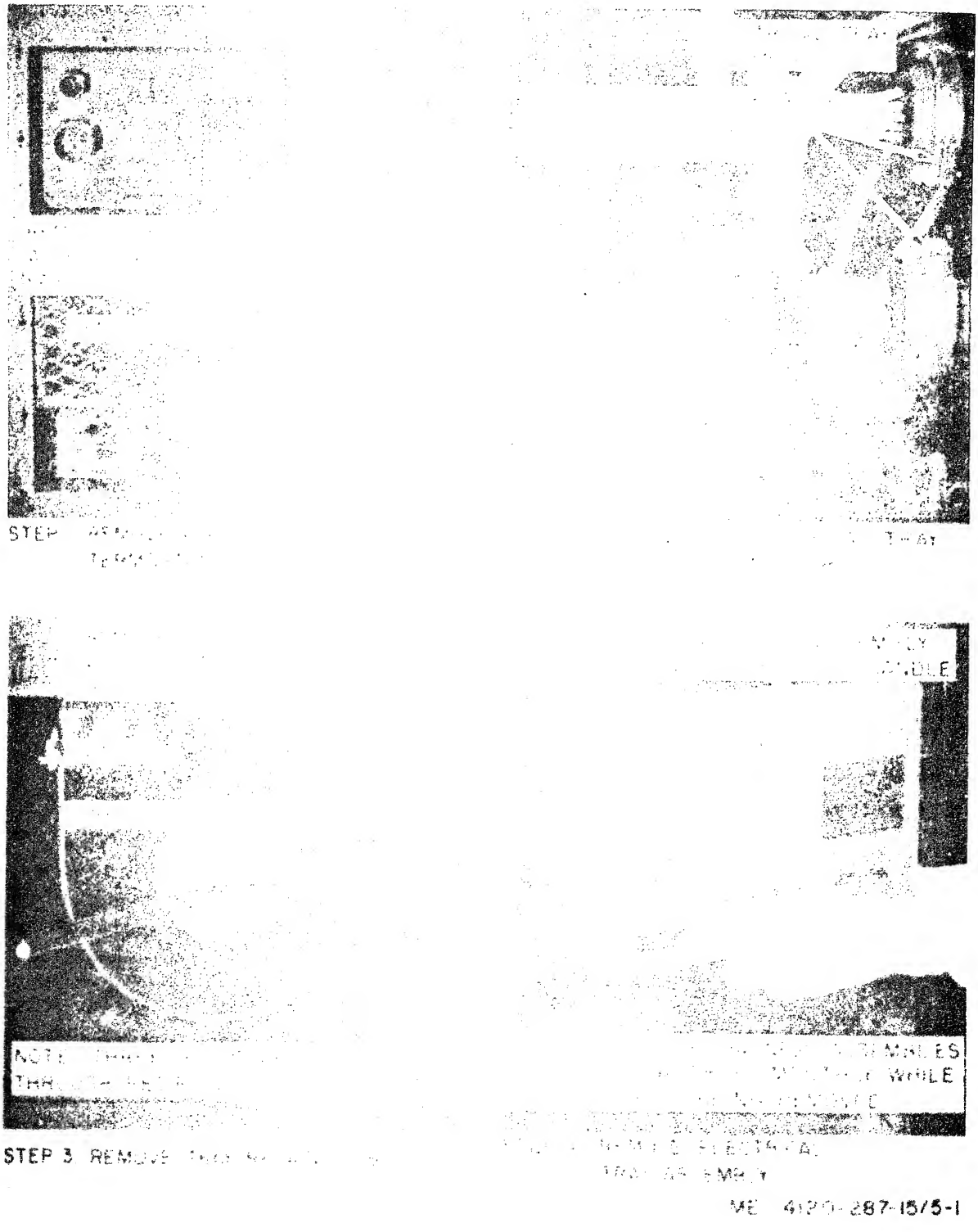


Figure 5-1. Electrical tray assembly removal and installation.

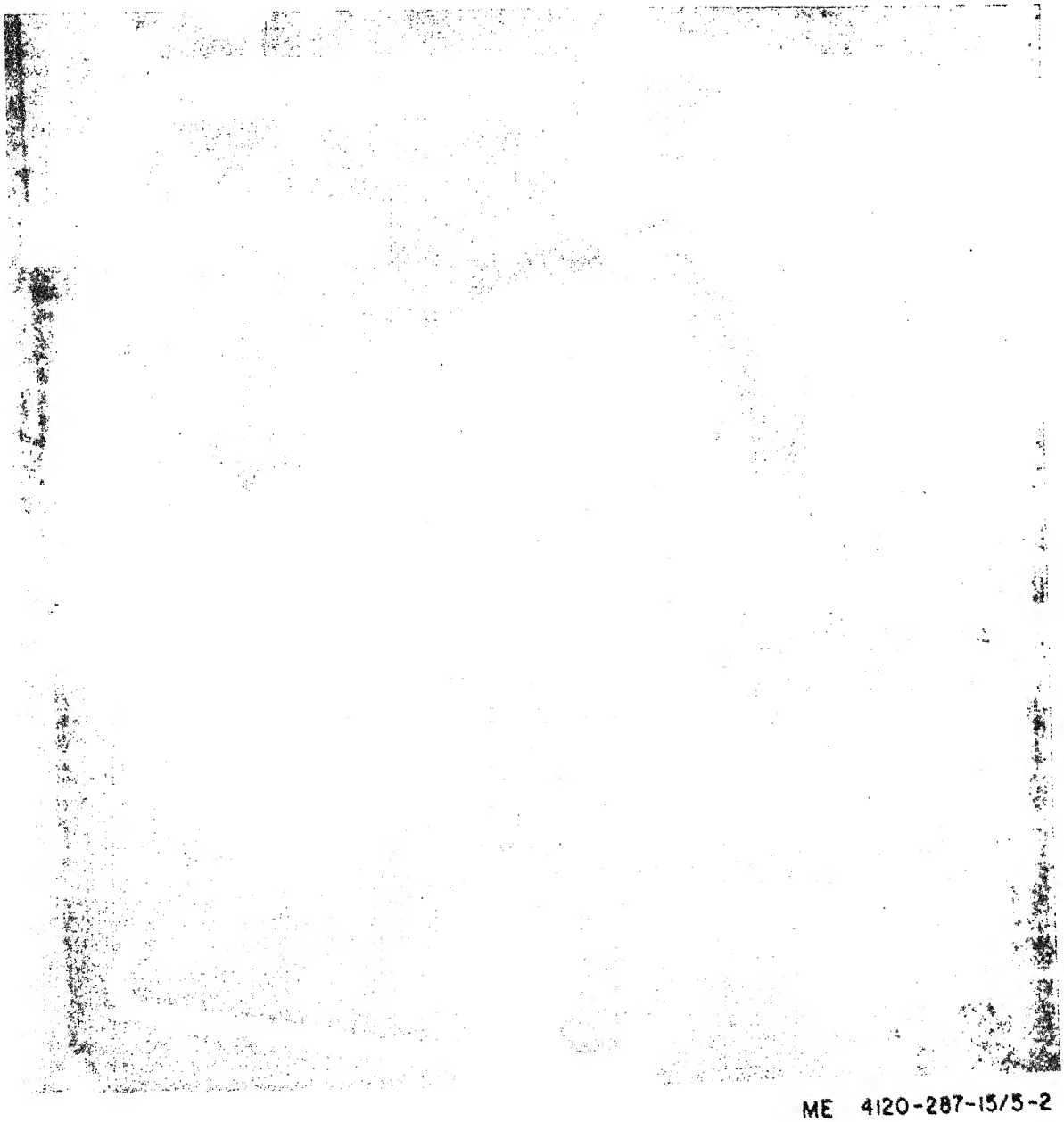


Figure 5-2. Motor compressor assembly removal and installation.

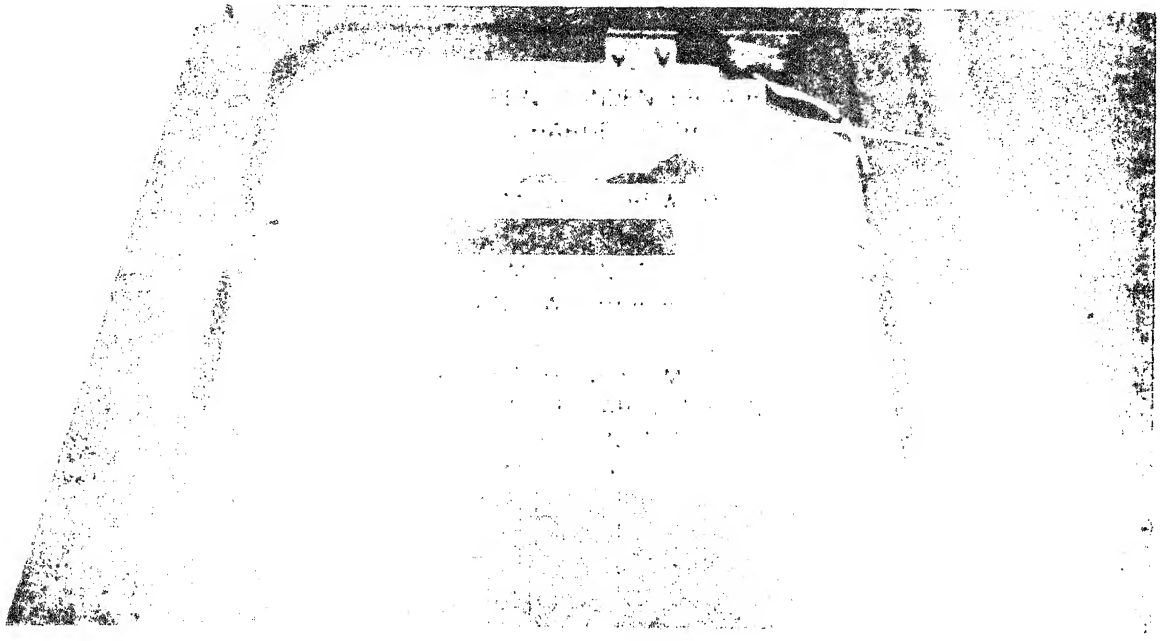
5-24. Condenser-subcooler Assembly

a. Removal.

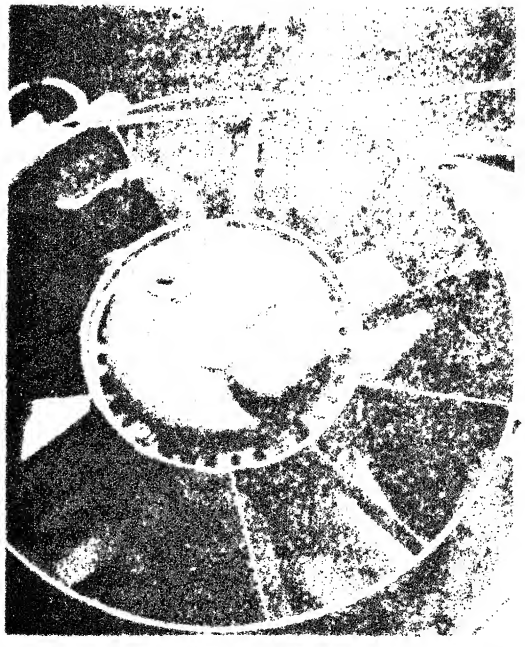
(1) Remove air conditioner right-side access panel (para 3-29 *a*).

(2) Discharge refrigerant system (para 7-7).

(3) Refer to figure 3-4 and remove condenser air inlet filter.



STEP 1 REM[illegible] ASSEMBLY



DISCONNECT [illegible]
FROM ELECTRICAL [illegible]

2 REMOVE [illegible]
AND WASHER [illegible]

3 LIFT CONDENSER FAN & [illegible]
OF CABINET THROUGH [illegible]
AIR DISCHARGE [illegible]

NOTE IT IS NOT [illegible]
REMOVE THE [illegible]
DISCHARGE [illegible]

STEP 2 REMOVE CONDENSER FAN ASSEMBLY

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Figure 5-3. Condenser fan assembly removal and installation.

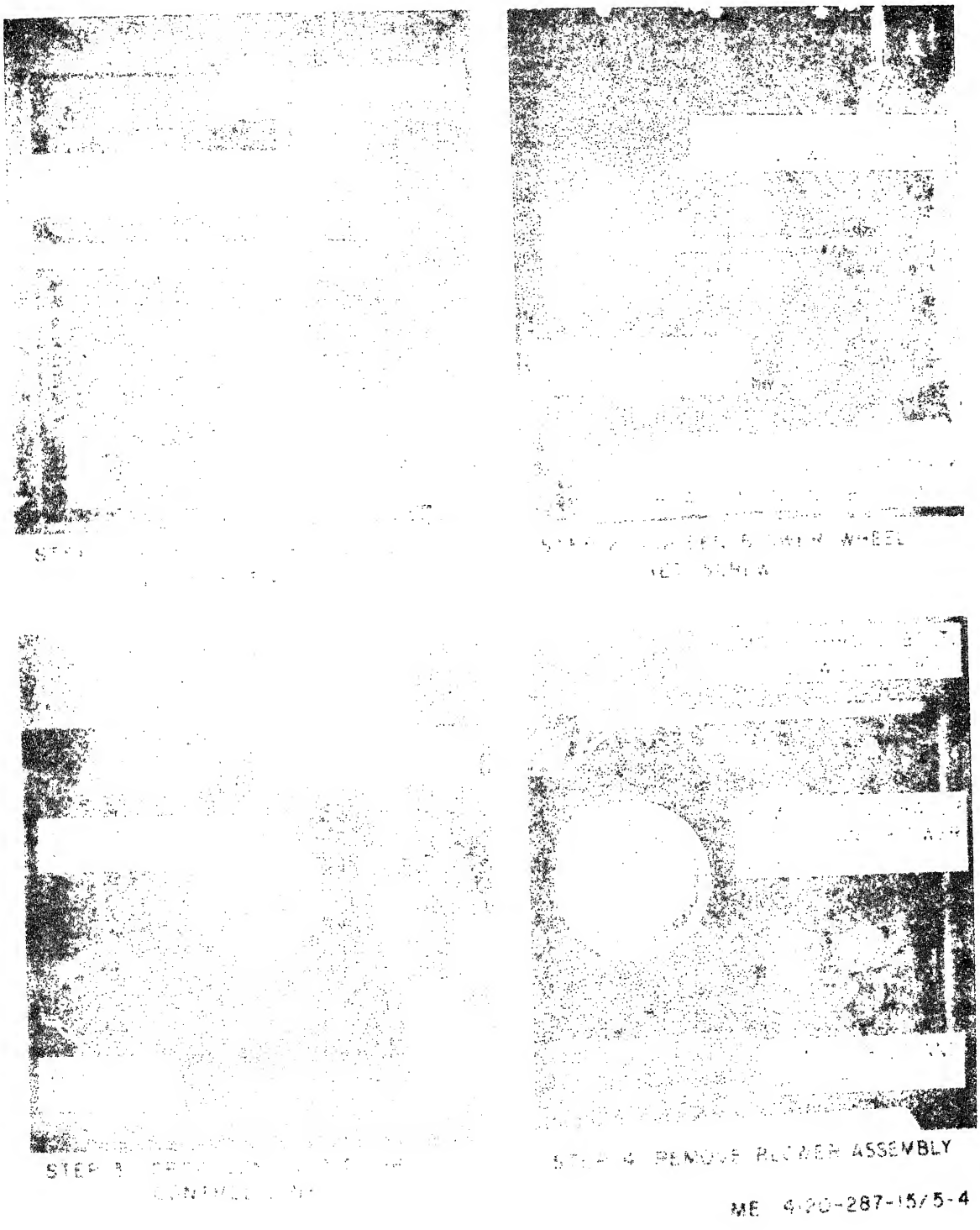

Figure 5-4. Evaporator blower removal and installation.

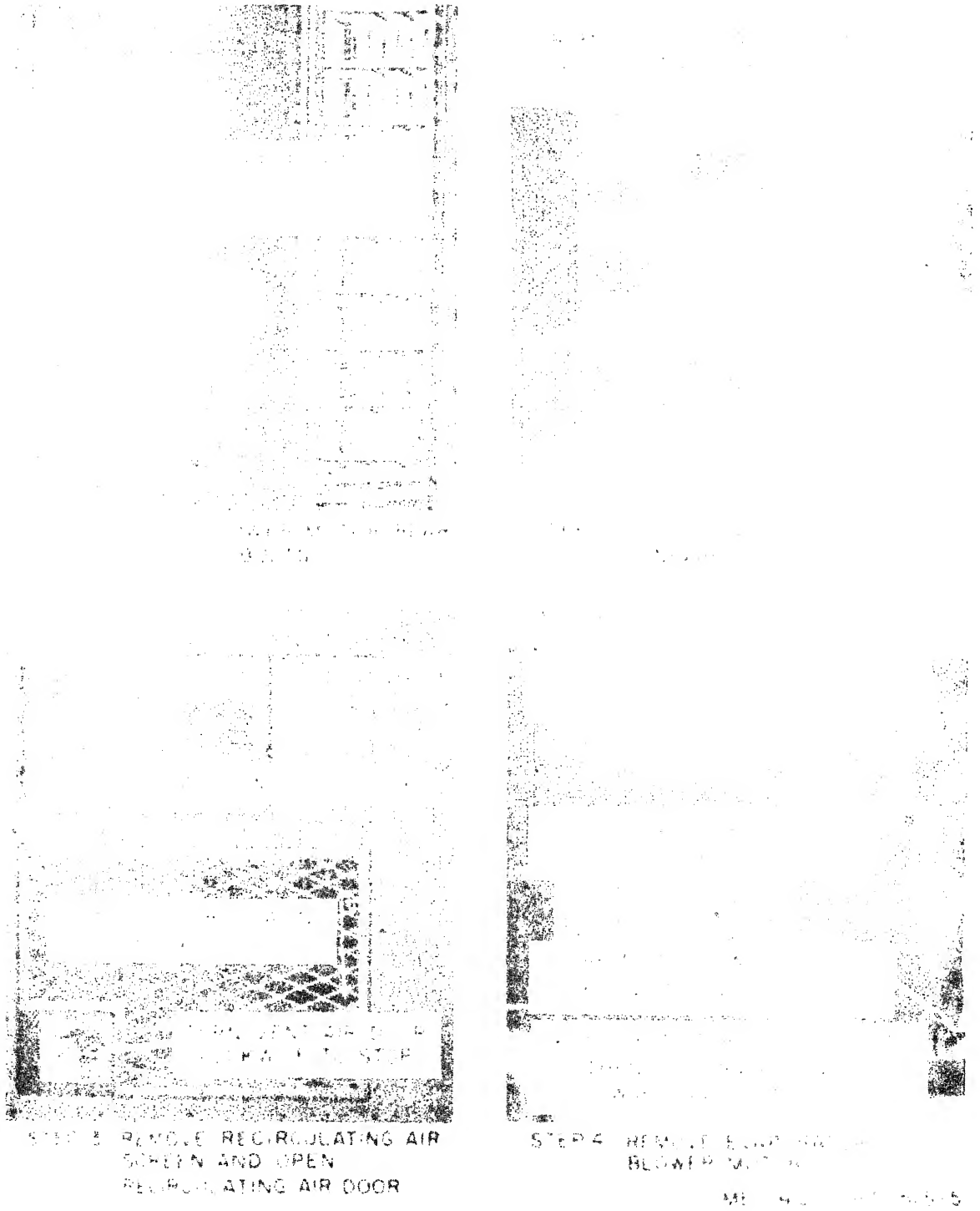

Figure 5-5. Evaporator blow motor removal and installation.

(4) Refer to figure 5–6 and remove condenser assembly.

b. Installation.

(1) Refer to figure 5–6 and install condenser assembly by performing steps in reverse order.

(2) Charge the refrigerant system (para 7–8 and 7–9).

(3) Refer to figure 3–4 and install condenser air inlet filter.

(4) Install air conditioner right-side access panel assembly (para 3–29 *b* and *c*).

5–25. Heater Assemblies

a. Removal. Refer to figure 5–7 and remove heater assemblies.

b. Installation. Refer to figure 5–7 and install heaters by performing steps in reverse order.

5–26. Mist Eliminator Assemblies

a. Removal.

(1) Remove heater assemblies (para 5–25 *a*).

(2) Refer to figure 5–8 and remove mist eliminator assemblies.

b. Installation.

(1) Refer to figure 5–8 and install mist eliminator by performing steps in reverse order.

(2) Install heater assemblies and conditioned air outlet screen (para 5–25 *b*).

5–27. Evaporator Assembly

a. Removal.

(1) Discharge and purge the refrigerant system (para 7–7 and 7–8).

(2) Remove evaporator air inlet filter (para 3–32 *a*).

(3) Remove mist eliminator (para 5–26 *a*).

(4) Remove electrical tray assembly (para 5–19 *a*).

(5) Remove the four evaporator assembly base retaining bolts, located at the rear top wall of the electrical tray recessed cabinet chamber.

(6) Refer to figure 5–9 and remove the evaporator assembly.

b. Installation.

(1) Refer to figure 5–9 and install evaporator assembly by performing steps in reverse order.

(2) Install the four evaporator assembly base retaining bolts through the electrical tray recessed cabinet chamber.

(3) Install electrical tray assembly (para 5–19 *b*).

(4) Install mist eliminator (para 5–26 *b*).

(5) Install evaporator air inlet filter (para 3–32 *a*).

(6) Charge the refrigerant system (para 7–9).

5–28. Refrigerant System Components

Refer to chapter 7 for removal and installation instructions of refrigerant system components.

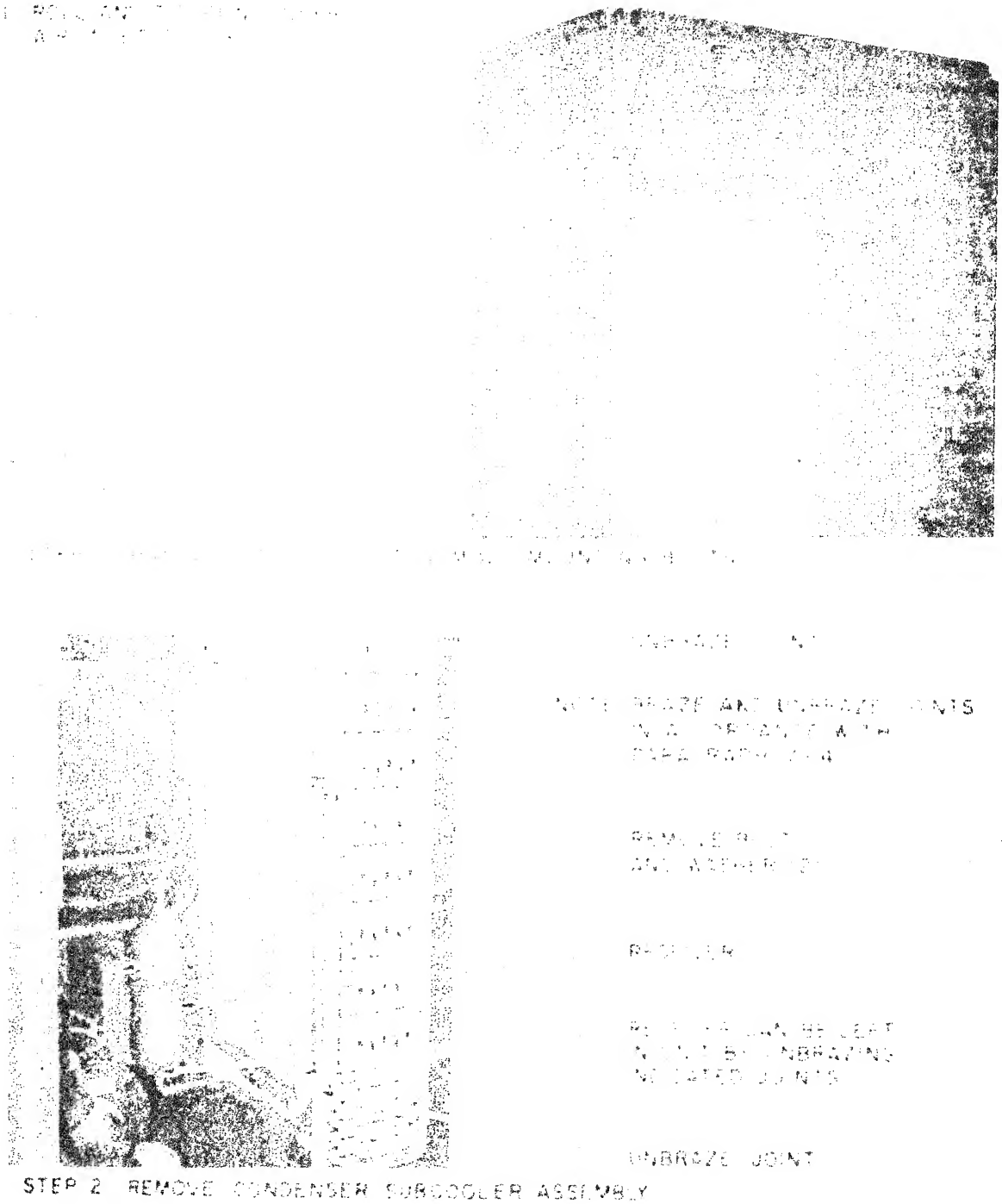

Figure 5–6. Condenser-subcooler assembly removal and installation.

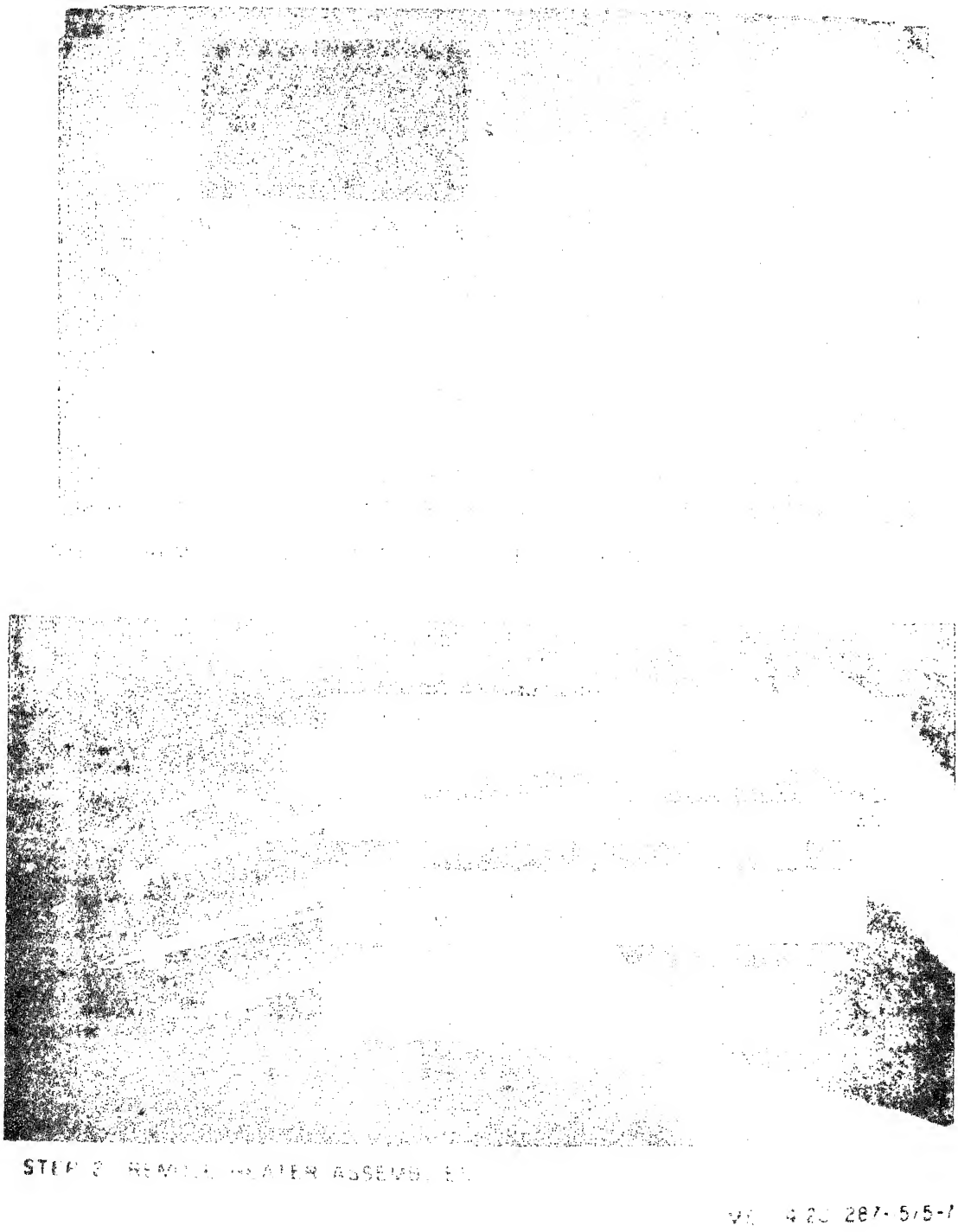

Figure 5–7. Heater assemblies removal and installation.

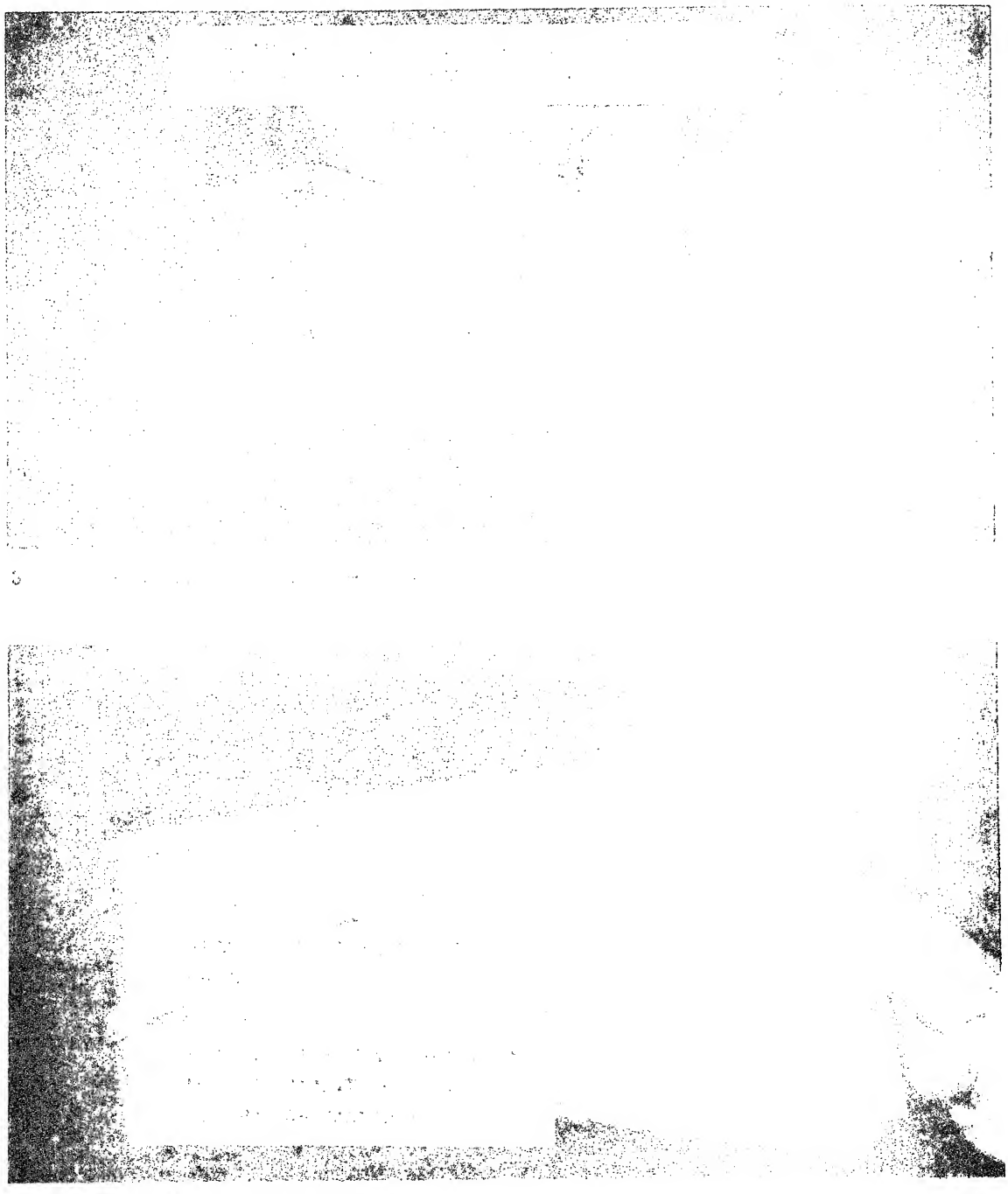

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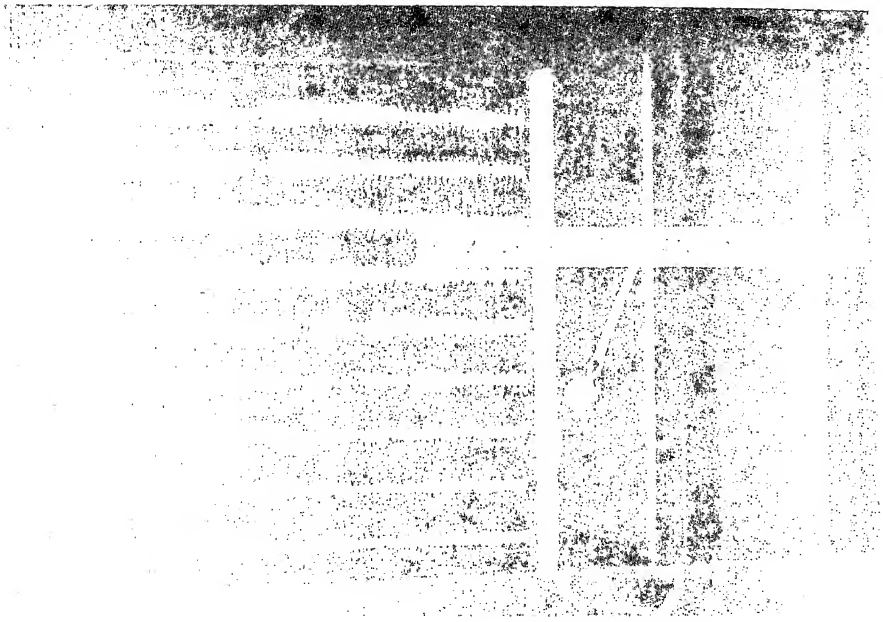
Figure 5-8. Mist eliminator removal and installation.



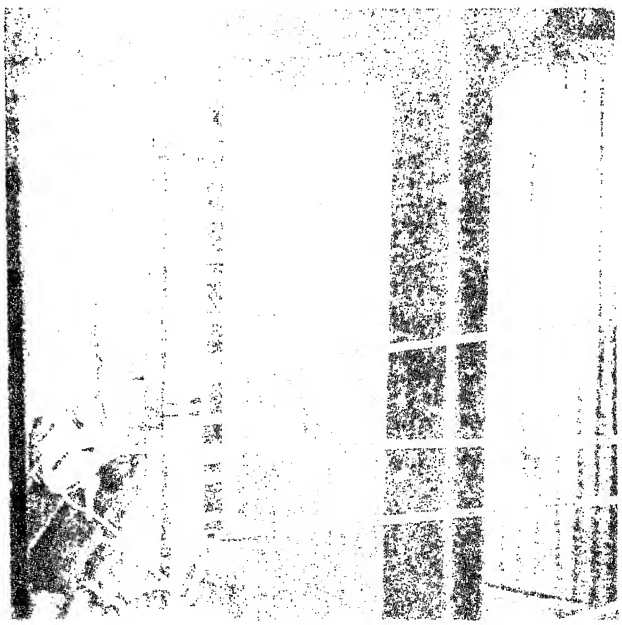


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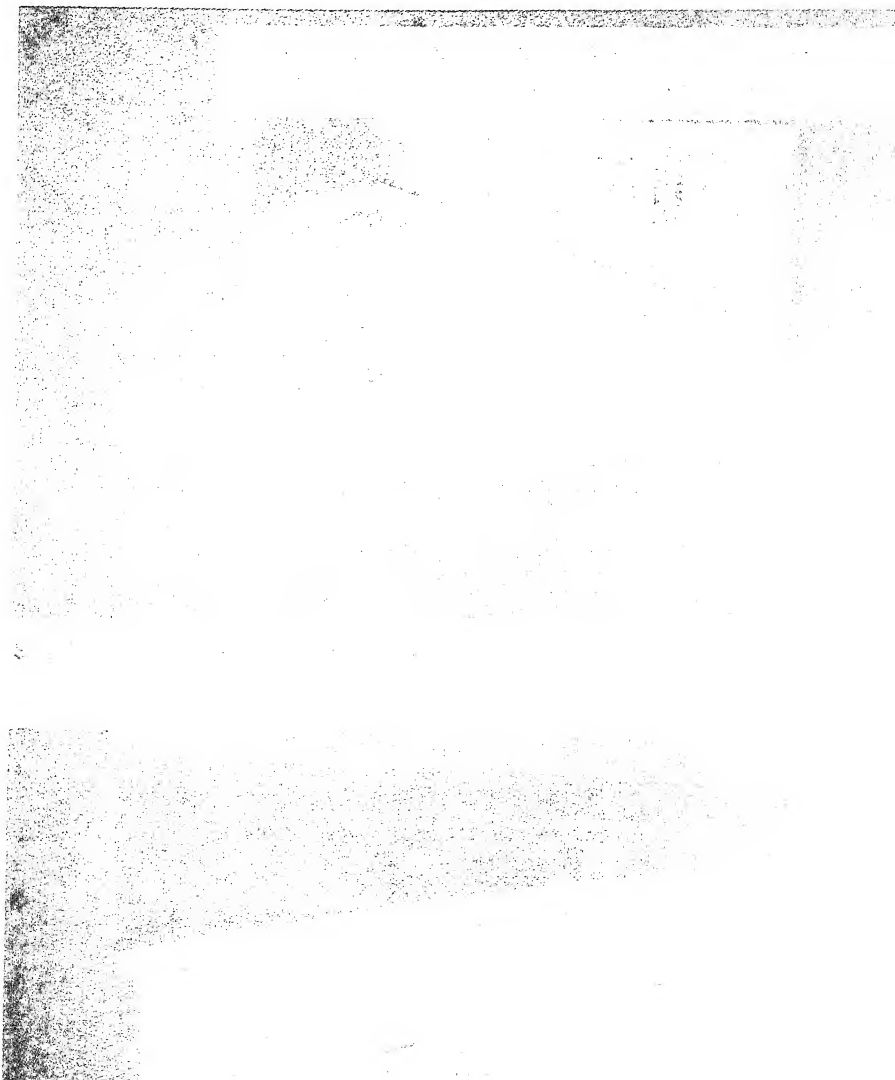
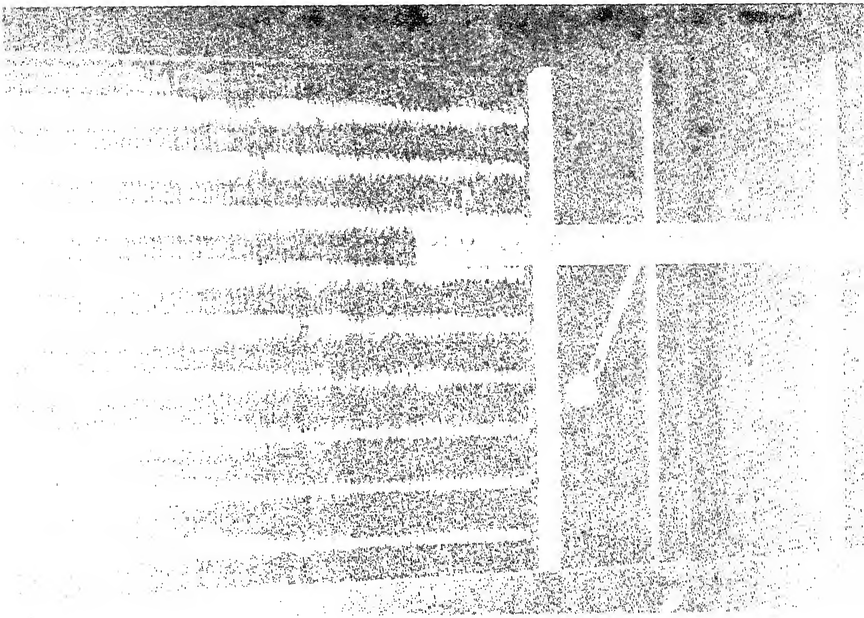
Figure 5-9. Evaporator assembly removal and installation.





[illegible] ASSEMBLY [illegible] MOUNTING BOLT

CHAPTER 6

ELECTRICAL SYSTEM REPAIR INSTRUCTIONS

Section I. REMOTE CONTROL BOX ASSEMBLY

6–1. General

The remote control box assembly (figs. 2–2 and 6–1) consists of a 5-gang, 4-position selector switch (air conditioning switch) and a 5000-ohm variable resistor (temperature control), as described in paragraph 2–8 *a*.

6–2. Removal

a. Set master circuit breaker to OFF position.

b. Remove remote control wiring harness plugs P102 and P103 from electrical tray remote control receptacle J102 and remote control box assembly receptacle J103, respectively.

c. Remove remote control box assembly from mounting site (para 3–38 *a*).

6–3. Testing

Using a multimeter set to read 10,000-ohms resistance, test the remote control box as follows:

a. *Temperature Control Variable Resistor.* When testing the temperature Control Variable Resistor perform the following:

(1) Turn temperature control knob to

b. *Air Conditioning Swi* the air conditioning swi following:

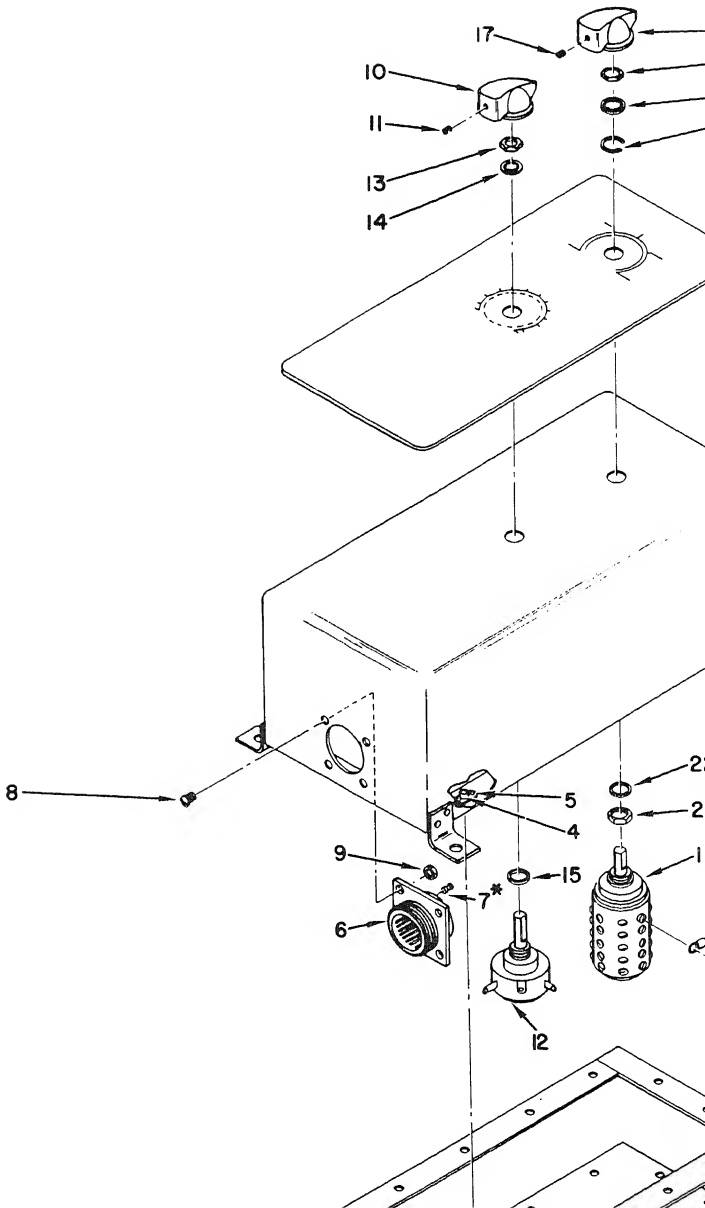
(1) Turn temperature COOL position.

(2) With multimeter nected to remote control bo tacle J103 terminal sets lis check air conditioning switc VENT, and COOL positio listed in table 6–1.

Table 6–1. Air Condition

Multimeter test leads at J103 terminal sets	Air cond	
	Warm	Off
A–E	0	0
A–F	C	0
B–D	C	0
B–H	V	V
C–J	0	0
C–L	C	0
D–H	V	0
D–K	C	0

0—Multimeter indicates open circuit betw
C—Multimeter indicates continuity betwe
V—Multimeter indicates continuity be
temperature control dial is in
ohms resistance when temperatu
position.


17
10
11
13
14
8
5
4
9
15
7*
6
12

1 Cover
2 Gasket
3 Screw (14)
4 Plate nut (14)
5 Rivet (28)
6 Electrical connector (J103)
7 Nylon plug (6)
8 Screw (4)
9 Nut (4)
10 Knob
11 Screw
12 Rheostat, 5000 ohms (R3)
13 Nut
14 Locking ring washer
15 Mounting seal
16 Knob
17 Screw
18 Switch (S2)
19 Nut
20 Lockwasher
21 Locking ring w
22 Bushing seal
23 Nut
24 Screw
25 Washer
26 Terminal lug
27 Switch identifi
28 Box

Figure 6–1—Continued.

b. Repair and Inspection.

(1) Using a light stream of clean, dry compressed air remove all dirt and dust from remote control box.

(2) Replace defective parts with new parts.

(3) Recheck remote cont
cordance with paragraph 6–3.

c. Reassembly. Reassemble
box assembly in reverse of nur
as illustrated in figure 6–1.

Section II. SENSING SWITCHES AND SOLENOID VALVE COIL

6–5. General

Note. Disconnect air conditioner from power source before performing any maintenance or inspection of electrical system, other than operation tests. The operating voltage of this air conditioner is dangerous; severe, possibly fatal shock may result from coming in contact with any part of the electrical system.

The sensing switches and solenoid valve are located throughout the air conditioner unit as shown in figure 6–2. The sensing switches and solenoid valve control the operating parameters and operation of the air conditioner. The following are discussed:

a. Condenser fan discharge door micro switch, S101.

b. Low ambient switch, S102.

c. High-low pressure switch, S103.

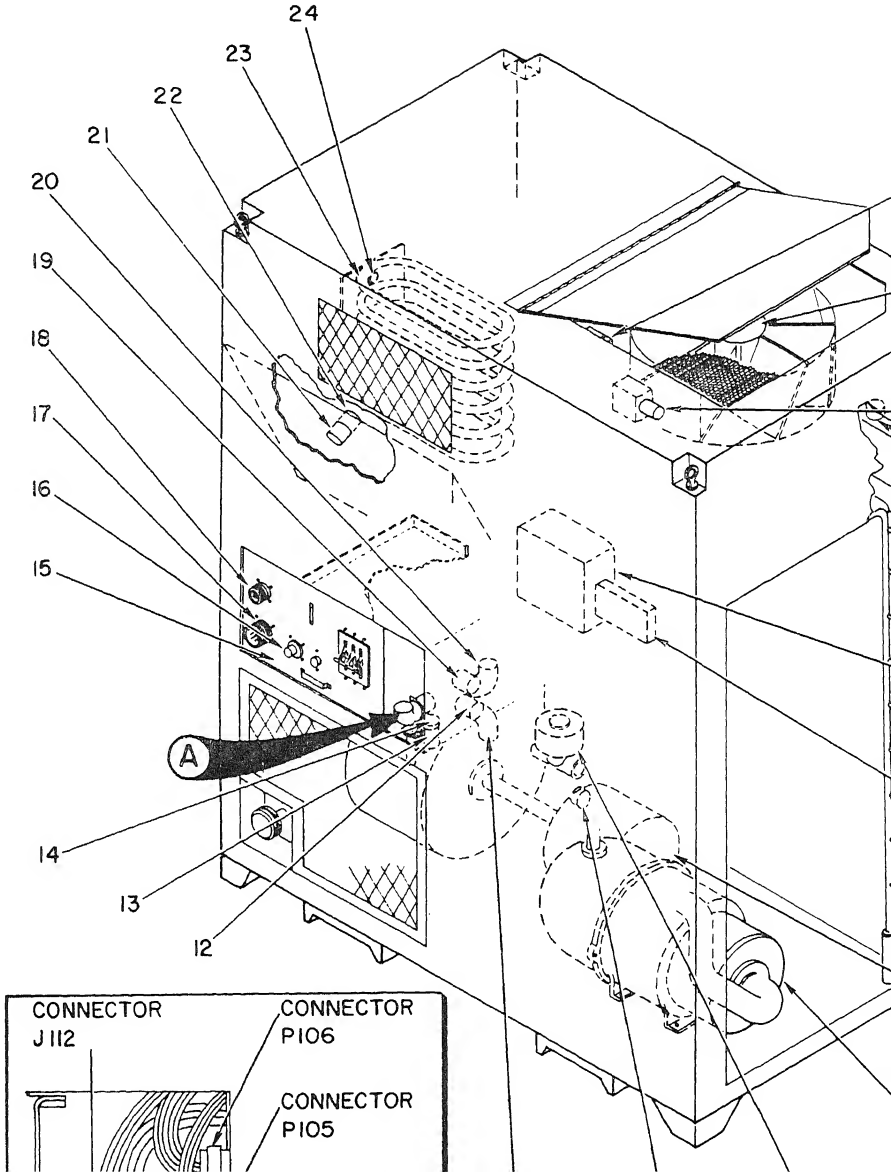
(2) Open the condenser
door and check for continuity
terminals M and L.

(3) Depress the micros
and check for an open circui
terminals M and L.

(4) If the condenser fan
switch does not make and bre
in *a* (2) and (3) of this parag
is defective and must be repla

(5) Repeat step *a* (3) of
closing the condenser door
microswitch. If the microswitc
when depressed by the door
position.

b. Low Ambient Switch (S
multimeter check low ambient


24
23
22
21
20
19
18
17
16
15
A
14
13
12
CONNECTOR J112
CONNECTOR P106
CONNECTOR P105

icroswitch S101
ondenser fan motor B101
oltage conversion connector P111
w ambient switch S102
igh-low pressure switch S103
erminal board TB-1
vaporator blower motor B102
ompressor motor B103
olenoid valve coil L101
oltage conversion connector P110
ectrical connector plug P111
hru-bulkhead electrical connector J105-J113
13 Electrical connector plug P109
14 Thru-bulkhead electrical connector J107-J
15 Electrical tray assembly
16 Fuse holder and fuse F1
17 Electrical connector jack J101
18 Electrical connector jack J102
19 Thru-bulkhead electrical connector J106-J
20 Electrical connector plug P108
21 Electrical connector plug P104
22 Electrical connection jack J104
23 Heater bank (2)
24 Heater temperature switch S104

Figure 6-2—Continued.

5) Reconnect wires 109 and 111 to ter- board TB1.

High-low Pressure Switch (S103). e leads 110 and 112 from Terminal d TB1; and check for continuity. If con- y exists replace switch. There is no ical method for checking high-low pres- switch operation in the air conditioner r operating conditions. It is recommended a suspected faulty high-low pressure h be replaced.

Heater Temperature Switch (S104). g a multimeter, check heater temperature h S104 as follows:

(1) Remove power input plug.

(2) Connect the multimeter test leads een J112-B and J112-D terminals.

(3) Check to determine that heater tem- ure switch is closed.

(4) Disconnect P107 from J107.

(5) Place a thermometer thru condi- d air outlet screen so that thermometer is near heater temperature switch.

(6) Connect power supply plug to Input er receptacle J101.

(7) Start air conditioner. Set air condi-

e. Thermostat (S105). Using a m check thermostat S105 as follows:

(1) Remove thermostat S1 3-39) leaving thermostat leads att terminal board TB1.

(2) Connect multimeter test terminal board TB2 contacts 1 and 2.

(3) Run air conditioner with a tioning switch in HEAT position an ature control switch set to maximu position.

(4) Set thermostat bulb in wat a temperature of 40 ± 5°F. Deter heaters are operating and that m indicates continuity between TB2 and 3.

(5) Set thermostat bulb in wat a temperature of 105 ± 10°F; then perature control switch to maximu position. Determine that heaters and that multimeter indicates an op between TB2 contacts 1 and 3.

(6) Set the air conditioning

(10) If thermostat does not meet criteria established in *e* (4), (5) and (8) of this paragraph, it is defective and must be replaced.

f. Solenoid Valve Coil L101. Test solenoid valve coil as follows:

(1) With air conditioner running in COOL mode and Temperature control switch set to maximum warm, place thermostat S105 in water having a temperature of 40 ± 5°F.

(2) Disconnec
from terminal Boa

(3) Apply 28
coil leads and
through refrigera
Remove 28VDC su
erant flow ceases.

(4) Replace a
coil with a new par

Section III. ELECTRICAL TRAY ASSEMBLY

6–7. General

The electrical tray assembly consists of the following items (figs. 2–3 and 6–3): Master circuit breaker, CB1; 28-volt, 3/4 amp fuse holder, F1; system reset switch, S1; elapsed time hourmeter, M1; power transformer, T1; silicon rectifier, CR1; control relays and line contactor relays, K101 thru K108; and associated wiring harness assemblies.

6–8. Removal

Remove electrical tray assembly (para 5–19).

6–9. Testing

***Warning:* Make sure master circuit breaker is set to OFF position and power supply is disconnected from POWER INPUT receptacle J101 when preparing for tests and connecting test leads.**

a. Master Circuit Breaker (CB1).

(1) Check power supply "hot" leads for 240-vac volts alternating current potential to ground.

(*a*) Check
3–37).

(*b*) Replace
fuse holder.

(2) *Phase seq*

(*a*) Using
vac across relay K

(*b*) If rea
phase sequence re
must be replaced.

(3) *Power T*

(*a*) Shunt
7 with a 25-ohm

(*b*) Using
30.2 ± 1 across tra

(*c*) Remove

(*d*) Shunt
6 with a 25-ohm

(*e*) Using
30.2 ±1 vac acro
and 6.

(*f*) Remove

(*g*) If rea

c. Control Relays. The control relays are as follows: trip relays K101; time delay relay K102; temperature control relay K103; and line contactor relays K104, K105, K106 and K107.

Warning: **Set master circuit breaker to OFF position and disconnect power supply from power input receptacle (J101) when testing the relays.**

(1) *Trip Relay (K101).*

(*a*) Connect the positive side of a 28 vdc power supply to rectifier (CR1) terminal C; and connect the negative side to transformer (T1) terminal 6.

(*b*) Press system reset switch.

(*c*) Using a multimeter, check for continuity across K101 terminals 5 and 3, and 2 and 11.

(*d*) If terminal 5 and 3, and 2 and 11, are open, trip relay K101 is defective and must be replaced.

(*e*) Using a jumper, momentarily connect K101 terminal 7 and 1; then remove jumper.

(*f*) Check K101 terminals 5 and 3, and 2 and 11 for an open circuit.

(*g*) If terminals 5 and 3, and/or 2 and 11 exhibit continuity, trip relay K101 is defective and must be replaced.

(*h*) Press system reset switch. Terminals 5 and 3, and 2 and 11 should now exhibit continuity; if not, either trip relay K101 or system reset switch S1 is defective and must be replaced.

(*i*) Set master circuit breaker to OFF position.

(*j*) Connect to K101 terminals 1 and 7, and test for continuity.

(*c*) Observe that
have elapsed and before
elapsed, multimeter reads

(*d*) If multimeter
tained within specified ti
delay K102 is defective a

(3) *Temperature con*

(*a*) Check K103
and 1 and 6 for continuity.

(*b*) If continuity
lay K103 is defective and

(*c*) Check for an o
K103 terminals 3 and 5.

(*d*) If K103 termi
continuity, relay K103 is
be replaced.

(*e*) Check for a
across K103 terminals 1 a

(*f*) If K103 termi
continuity either relay K1
defective and must be repl

1. Check capacit
condition.

2. Replace capac
(shorted).

3. Replace relay
C2 is not shorted.

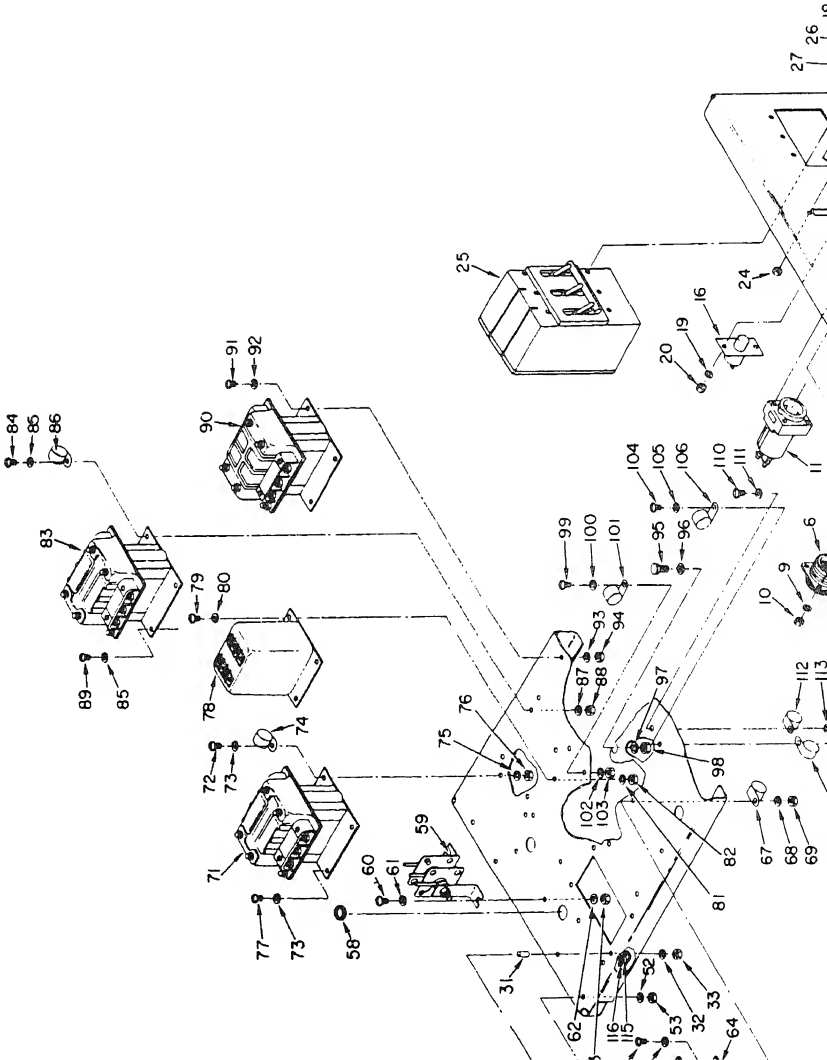
(*g*) Disconnect ju
from K103 terminal 8;
across relay K103 termina

(*h*) Check that K
3 and 1 and 7 exhibit cont

(*i*) If continuity
lay K103 is defective an

(*j*) Check for an
K103 terminals 2 and 5.

(*k*) If relay K103
exhibit continuity, relay
must be replaced.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116
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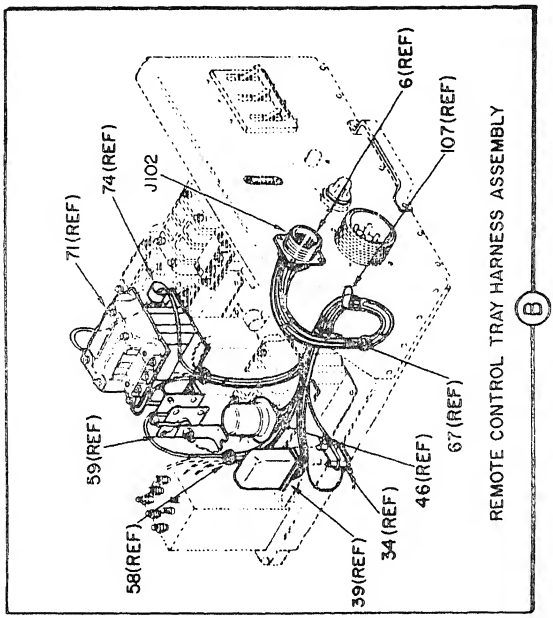
64

42 Time delay relay (K102)
43 Screw (2)
44 Lock washer (2)
45 Nut (2)
46 Temperature control relay (K103)
47 Cycling capacitor (3)
48 Screw (2)
49 Lock washer (2)
50 Nut (2)
51 Power transformer, low voltage supply (T1)
52 Lock washer (4)
53 Nut (4)
54 Nut (14)
55 Lock washer (7)
56 Flat washer (14)
57 Jumper (shorting link) (2)
58 Grommet (4)
59 Rectifier
60 Screw (2)
61 Flat washer (2)
62 Lock washer (2)
63 Nut (2)
64 Heater relay (K107)
65 Screw (2)
66 Lock washer (4)
67 Clamp (2)
68 Flat washer (4)
69 Nut (4)
70 Screw (2)
71 Evaporator fan motor relay (K106)
72 Screw
73 Lock washer (4)
74 Clamp
75 Flat washer (4)
76 Nut (4)
77 Screw (3)
78 Phase sequence relay (K108)
79 Screw (4)
80 Lock washer (4)
81 Flat washer (4)
83 Condenser fan motor relay (K105)
84 Screw
85 Lock washer (4)
86 Clamp
87 Flat washer (4)
88 Nut (4)
89 Screw (3)
90 Compressor motor relay (K104)
91 Screw (4)
92 Lock washer (4)
93 Flat washer (4)
94 Nut (4)
95 Bolt
96 Flat washer
97 Lock washer
98 Nut
99 Screw
100 Lock washer
101 Clamp
102 Flat washer
103 Nut
104 Screw
105 Lock washer
106 Clamp
107 Clamp
108 Flat washer
109 Nut
110 Screw
111 Lock washer
112 Clamp
113 Flat washer
114 Nut
115 Plate nut (6)
116 Blind rivet (12)
117 Tray assembly
118 Compressor relay harness assy
119 Evaporator relay harness assy
120 Terminal board (TB2) harness assembly
121 Condenser harness assembly
122 Heater cable harness assembly

TM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REMOTE CONTROL TRAY HARNESS ASSEMBLY
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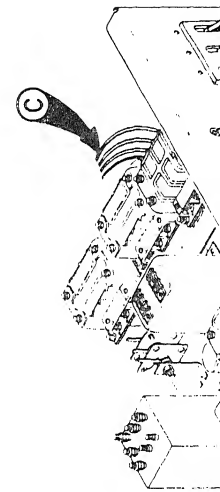
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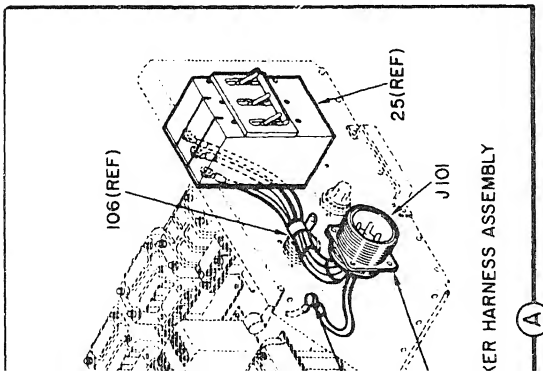
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KER HARNESS ASSEMBLY
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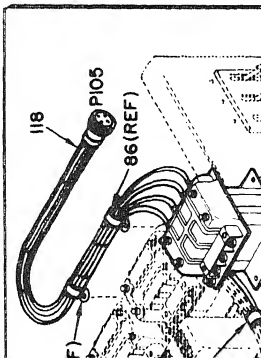
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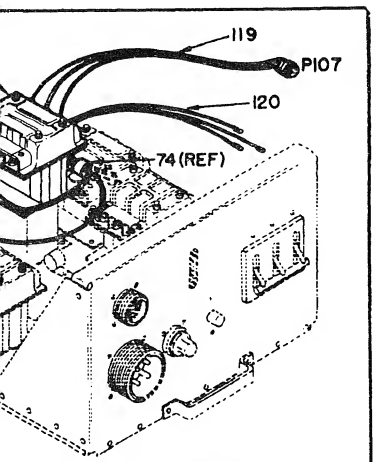
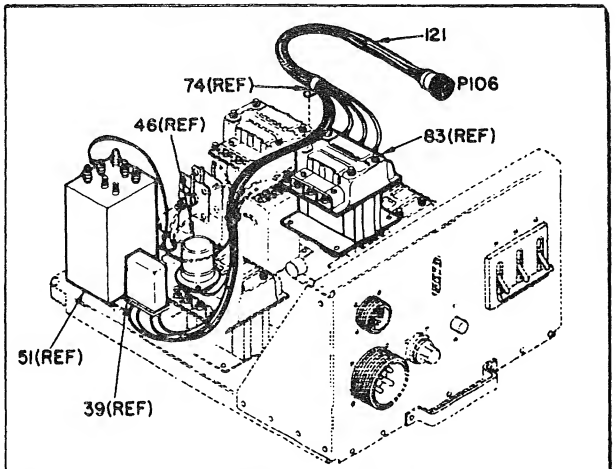


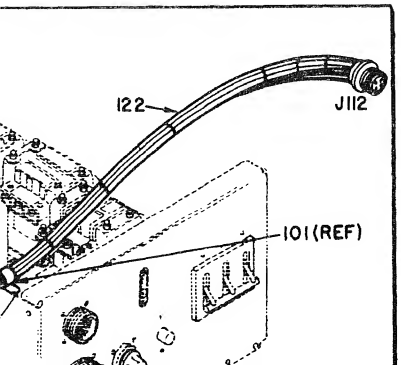
RELAY HARNESS ASSEMBLY
OARD (TB2) HARNESS ASSEMBLY

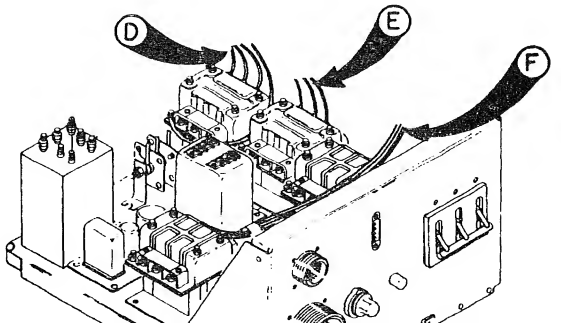
D



CONDENSER TRAY HARNESS ASSEMBLY

E





(*n*) Remove 28 vdc power supply from K103 terminals 4 and 8; then replace jumper J (fig. 1–9).

(4) *Line contactor relays (K104, K105,* K106 and K107).

Note. The operation of the four line contactor relays are identical; therefore one set of instructions are given to cover all line contactor relays.

(*a*) Remove 28 vdc power supply leads from rectifier (CR1) terminal C and transformer (T1) terminal 6.

(*b*) Check for an open condition across relay terminals A1 and A2, B1 and B2, and C1 and C2.

(*c*) If continuity is exhibited across any one of the three terminal sets, the relay is defective and must be replaced.

(*d*) Apply 28 vdc across relay terminals 1 and 2.

(*e*) Check for continuity across relay terminals A1 and A2, B1 and B2, and C1 and C2.

(*f*) If co
any one of the t
defective and mu

6–10. Electrical

a. Disassembl
assembly in nun
in figure 6–3. F
quired to replace

b. Repair and

(1) Using a
compressed air
electrical tray as

(2) Replace
parts.

(3) Check
bly component i
6–9.

c. Reassembly.
assembly in reve
illustrated in figu

Section IV. MOTORS AND HEATER ASSE

6–11. General

The motors and heater assembly operate at line voltage. Remove and test only the suspected faulty component.

6–12. Removal

a. Remove evaporator motor (para 5–23 *a*).

b. Remove condenser fan motor assembly (para 5–21 *a*).

c. Remove motor compressor assembly (para 5–20 *a*).

d. Remove heater assembly (para 5–25 *a*).

a. Place the m
tested on a workb

b. Apply work
or heater assemb

c. If the moto
function, it must

6–14. Replacem

a. Replace eva

b. Replace co

CHAPTER 7

REFRIGERANT SYSTEM REPAIR INSTRUCTIONS

Section I. CHARGING THE REFRIGERANT SYSTEM

General

This section describes the methods used harge, discharge and add oil to the refrigt system; and to check the system for rerant leakage.

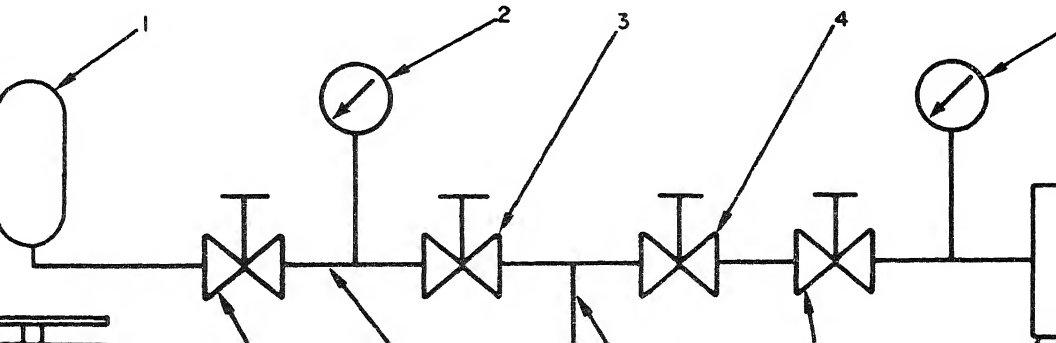
Make sure the refrigerant charging aptus (fig. 7–1) is clean and in operational ition.

When adding oil use a clean, moisture- oil container. Cap oil container immedi- after use to eliminate moisture contamion of the oil.

7–2. Precautions When Handling Refrigerant

Although refrigerant-12 is one of refrigerants to handle, it is impo personnel observe the following p in handling the refrigerant.

a. Do not discharge refrigera areas having exposed flames. A hea tration of refrigerant in contact w flame produces a gas which is tox tacks bright metal surfaces.



b. Do not expose the eyes to the refrigerant. If refrigerant-12 comes in contact with eyes, observe the following instructions.

(1) Do not rub the eye(s).

(2) Arrange at once to take the effected person to an eye specialist.

(3) Put drops of sterile mineral oil into the eyes to remove the excess refrigerant.

(4) Wash the eyes with either a weak solution of boric acid or a sterile salt solution (not to exceed 2 percent sodium chloride).

c. Do not expose the skin to the liquid refrigerant. If the liquid comes in contact with the skin treat the injury the same as though the skin has been frostbitten or frozen. If a person is overcome in an area which lacks oxygen because of the presence of a high concentration of refrigerant-12, treat the person by applying artificial respiration produced manually or by a pulmotor.

7–3. Refrigerant Service Cylinder Handling Procedures

The following precautions must be observed when handling refrigerant bottles.

a. Do not leave the refrigerant bottle uncapped. All refrigerant bottles are shipped with a metal screw cap to protect the valve and safety plug from damage. Replace the cap after each use of the refrigerant bottles.

b. Do not carry or otherwise transport a refrigerant bottle in the passenger compartment of a vehicle or carrier. Do not expose refrigerant bottle to radiant heat from the sun because the resulting increase in pressure can cause the safety plug to release or the bottle to burst.

c. Never subject the refrigerant bottle to

c (1)). If the re
additional refrigera
will appear in the l

b. Set Master Cir
tion.

7–5. Adding Refrig

a. Remove the
panel access assemb

b. Set up the refr
apparatus, (fig. 7–1
section.

c. Close the refri
vacuum control valv

d. Connect the re
refrigerant-12 bottle

Warning: Wea
goggles when handl
cylinders.

e. Remove the ai
cap and connect th
hose to the charge
coupling on the ho
charge valve.

f. Open the char
trol valve to permi
from the coupling a

g. When the re
the air trapped in t
hose, tighten the c
close the refrigeran

h. Unlock the s
refrigerant-12 bottl

i. Open the air

Note. The maximu
bottle shall not exceed

the liquid sight glass have been eliminated, close the refrigerant control valve. Observe the liquid refrigerant sight indicator for three to four minutes after flow clears to ascertain that sufficient refrigerant-12 has been added to the system.

Caution: **Do not overcharge the refrigerant system. After each small quantity of refrigerant–12 has been added to the refrigerant system, allow three to four minutes for the refrigerant to circulate before adding more refrigerant. Do not attempt to meter the flow of refrigerant–12 with the air conditioner charge valve.**

n. Set master circuit breaker to OFF position.

o. Note scale reading and add one additional pound of refrigerant-12 to refrigerant system.

p. Remove the air conditioner right-side access panel assembly.

q. Close air conditioner charge valve.

r. Close the refrigerant-12 bottle valve.

s. Disconnect the refrigerant supply hose from the refrigerant-12 bottle.

t. Disconnect the evacuation and charge hose from the air conditioner charge valve and cap the charge valve.

***Warning:* High pressure refrigerant is trapped in the charging line. Caution should be used in releasing this pressure.**

u. Inspect the refrigerant system for leaks (para 7–6).

v. Install the air conditioner right-side access panel assembly (para 3–29 *c*).

(1) *Leak test.* Remov
assemblies (para 3–23 *a*, 3

***Warning:* Do not us**
in the presence of explosive
es. The area in which the
be used must always be ch
explosimeter. If the atmos
partment area causes any
scale of the explosimeter
area must be purged or cl
sive vapor before the leak
lized.

Caution: **Do not exp**
tor probe to large leaks th
without the use of the leak
prevent damage to the lea

(2) Pass the leak dete
refrigerant lines, fittings,
joints and valves.

Note. To obtain good leak
the leak detector in a draft, a
leak detector probe to refriger
period of time.

(3) Pass the leak det
accessible welded joints or
as the condenser and eva
Check the compressor hou
erant liquid sight indicator.

(4) Mark all leaks an
completion of leak test (p

b. A Halide torch lea
utilized in much the same
tronic type Halogen leak
precautions concerning th
electronic type Halogen l
presence of explosive or
equally applicable to the

(3) The exploring tube of this detector should be run over all sweat fittings, all mechanical couplings, and all valves. All portions of the system under refrigerant pressure should be methodically checked with this device.

(4) Check the refrigerant charge level (para 2–9 *c* (1)).

(5) Install the housing panels (para 3–23 *c*, 3–27 *c* and 3–29 *c*).

7–7. Discharging Refrigerant System

a. Remove air conditioner right-side access panel assembly (para 3–29 *a*).

b. Remove the air conditioner charge valve cap.

c. Attach a hose to the charge valve outlet and place the other end of the hose into a 500 ml (milliliter) graduated cylinder.

d. Discharge refrigerant by opening charge valve.

Note. Bleed the refrigerant slowly to prevent blowing oil out of the motor compressor assembly.

e. Remove hose from charge valve when refrigerant discharge ceases. Note the amount of oil collected in the 500 ml graduated cylinder.

7–8. Evacuating Refrigerant System

Note. Replace the filter-drier unit before evacuating and charging the refrigerant system.

a. Connect charging apparatus evacuation and charge hose (fig. 7–1) to the charge valve. Connect the vacuum pump power cord to a suitable electrical power source.

b. Open the vacuum pump shut-off valve and the vacuum control valve. Check that the

h. Disconnect the
hose from the air
and replace the valve

i. Disconnect the

j. Install the ai
panel assembly.

7–9. Charging Refri

Note. Replace the fil
refrigerant system.

a. Discharge and
system according to

b. Connect the re
refrigerant-12 bottle
control valve to eva
ply hose. Close the
when system pressur
of mercury vacuum.

Warning: Wea
goggles when handl

c. Release the sca
platform scale. Adj
tain a zero scale read

d. Invert the re
place it on the pla
weight of the refrig

Note. The refrige
rapidly when the refrig
inverted position. If the
in a cold area, the press
be sufficient to charge t
refrigerant-12 bottle in
120°F).

Warning: Do n
open flame or apply

e. Close the vacuu

f. Shut down the

g. Open the ref

h. Open the charg
trol valve, and obse

i. Close the air conditioner charge valve.

j. Close the refrigerant-12 bottle valve.

k. Disconnect the evacuation and charge hose from the charge valve.

l. Disconnect the refrigerant supply hose from the refrigerant-12 bottle, and remove the platform scale of the charging unit.

m. Lock the platform scale beam lock.

n. Disconnect the vacuum pump power cord from power source.

o. Inspect the refrigerant system for leaks (para 7–6).

p. Install the air conditioner right-side panel assembly (para 3–29 *c*).

7–10. Adding Compressor Oil

a. General. Oil is added to the refrigerant system only when oil is lost due to discharging the refrigerant system or replacing a major component. Oil is added after the refrigerant system is discharged and evacuated (para 7–7 and 7–8) and prior to charging (para 7–9).

b. Adding Oil. Using the apparatus shown in figure 7–2, add oil to the refrigerant system as follows:

(1) Discharge refrigerant (para 7–7).

(2) Evacuate refrige
ing to paragraph 7–8. ste

(3) Place oil (FEI
RCO–3 Type III), in su
make up the oil needed
graph 7–7. step *e*) into t
der. In addition add suffic
cylinder to make up for a
a removed refrigerant sys

(4) Open oil flow co
2) and place dip tube into
then close oil flow contro

(5) Connect oil deliv
ditioner charge valve.

(6) Open air conditi

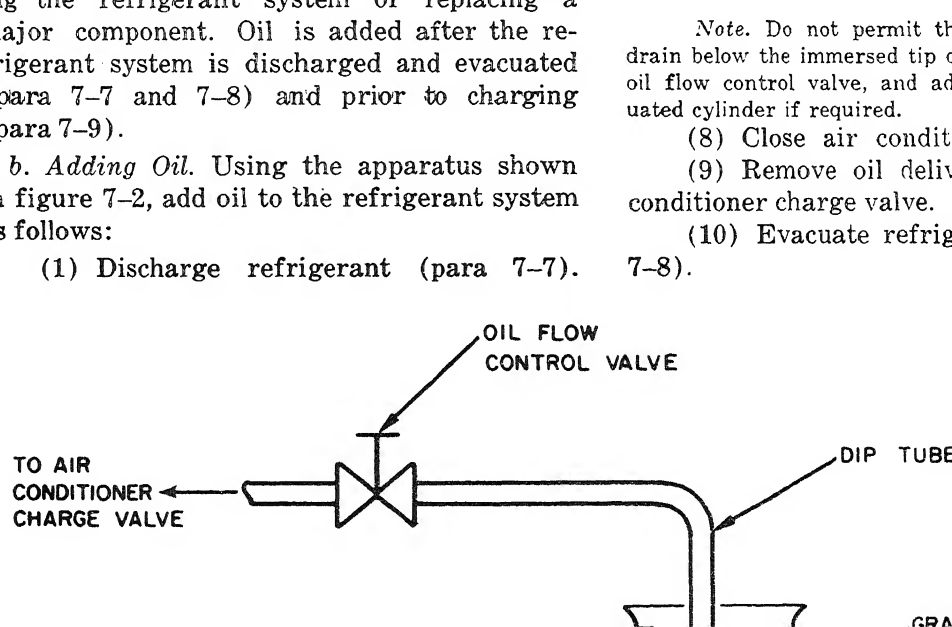
(7) Using the oil
allow sufficient oil to en
system to make up for lo
flow control valve.

Note. Do not permit th
drain below the immersed tip o
oil flow control valve, and ad
uated cylinder if required.

(8) Close air condit

(9) Remove oil deliv
conditioner charge valve.

(10) Evacuate refrig
7–8).



Section II. REFRIGERANT TUBING SERVIC

7-11. General

a. This section describes the methods used to clean and replace the refrigerant carrying tubing in the air conditioner.

b. The maintenance area should be equipped with such standard items of equipment as suitable air and electrical outlets and work benches. It is important that the maintenance area be clean and dust-free. Keep hardware and small parts together in trays to prevent them from being mislaid. Cover parts which are to stand for any period of time with clean paper or suitable coverings.

c. Discard all lockwashers, tab lockwashers, preformed packings, and composition gaskets as they are removed. When removing preformed packings, be careful not to damage the preformed packings cavities and/or adjacent surfaces involved in sealing.

7-12. Maintenance of Refrigerant System in Air Conditioning Unit

The refrigerant system piping must be absolutely clean and the joints properly connected in order to eliminate contamination or leakage of the refrigerant.

a. Keep all tubing sealed. When a refrigerant line is disconnected, seal it immediately with masking tape or plug it depending on the type of connection.

b. Keep all installation and servicing tools, test gauges, and replacement parts clean.

c. Do not keep the air conditioning unit open longer than necessary. When a system

tion, ranges from (

b. Fittings. Braz
are used at tube j
the possibility of

7-14. Brazed Con

a. Opening a Br
a brazed joint per

(1) Discharge
from the air condi
Purge the area aro
to assure that any
has been expelled fr

(2) Using an
the joint beyond
filler material.

(3) Using w
or other appropria
joined tubes before
ature drops below

Caution: Us
immediately seal a
mosphere. This is
moisture and/or di
cycle system.

b. Joining Brazed

(1) Braze fit
Military Specificat

(2) Use class
material as designa

7-15. Flared Joint

a. General. The
sembly with a flare
machined to accom

7–16. Maintenance of Chemical Stability in Air Conditioning System

a. General. In order to ensure maximum cleanliness of the air conditioning unit's internal components which, in turn, will be reflected by a higher standard of system performance, the following notations must be followed:

(1) Keep all tubing sealed. When it becomes necessary to disconnect a refrigerant line, it should be immediately sealed with masking tape or plugged depending on the type of connections. It must be remembered that all air contains moisture and air that enters any part of the system will carry moisture with it and the exposed surfaces will collect moisture quickly.

(2) Keep all installation and servicing tools, test gauges, and replacement parts clean.

(3) Use a clean dry oil container for lubrication requirements. When adding oil, the container should be exceptionally clean and dry. The oil container should be kept capped immediately after use.

(4) Do not keep the air conditioning unit open longer than necessary. When it is necessary to open a sys and other equipment to ready for use so that mi to perform the operation

(5) A vacuum pu after performing servic any air that might hav

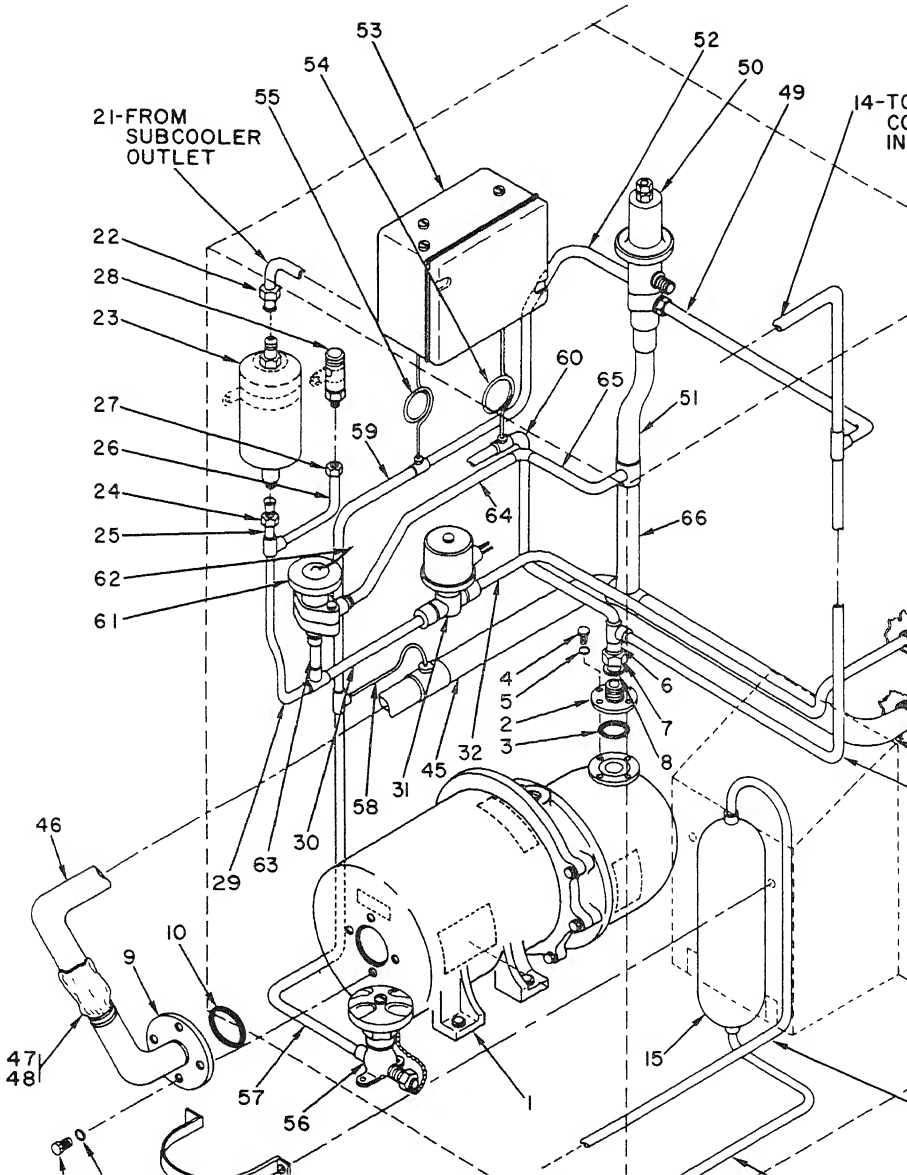
b. Cleaning Tubing. tubing has been repaire wise altered the follo recommended:

(1) A clean, lint drawn through the tubi or an electricians tape. the course particles of

(2) A clean, lintle carbon tetrachloride sh the pipe. This proced the saturated cloth is

(3) A clean cloth pressor oil, squeezed d the tubing again. This If possible, visual insp to see that tubing is pe

(4) The cleaning pulling through a clean cloth must be lintless lint will cause almost a


21-FROM SUBCOOLER OUTLET
14-TO CONDENSER INLET
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66
4
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45
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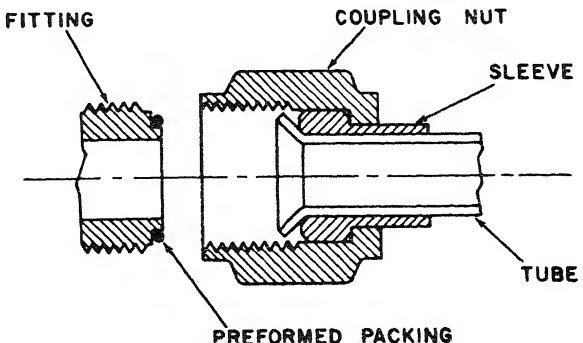
47
48
57
56
1
15

11 Bolt (4)
12 Flat washer (4)
13 Compressor outlet to condenser inlet tube
14 Condenser inlet tube
15 Receiver
16 Screw (2)
17 Flat washer (2)
18 Bracket
19 Receiver inlet tube
20 Subcooler inlet tube
21 Subcooler outlet tube
22 Refrigeration flare nut
23 Filter-drier
24 Refrigeration flare nut
25 Filter-drier outlet tube
26 Pressure relief valve inlet tube
27 Solder joint to straight pipe thread adapter
28 Pressure relief valve
29 Filter-drier to liquid quench valve tube
30 Solenoid valve inlet tube
31 Solenoid valve
32 Solenoid valve outlet tube
33 Grommet
34 Refrigerant liquid sight indicator inlet tube
35 Refrigerant liquid sight indicator
36 Thermostatic expansion valve inlet tube
37 Thermostatic expansion valve
38 Thermostatic expansion valve remote bulb tubing
39 Thermostatic expansion valve external equalizer tube
40 Evaporator inlet distributor
41 Evaporator outlet manifold tu
42 Evaporator outlet tube
43 Grommet
44 Refrigerant return thru-bulkh
45 Refrigerant return tube
46 Compressor inlet tube
47 Insulation tubing
48 Insulation tape
49 Hot gas by pass valve inlet tub
50 Hot gas by pass valve
51 Hot gas by pass valve outlet tu
52 Hot gas by pass valve pilot t
53 High-low pressure switch
54 High-low pressure switch high
55 High-low pressure switch low
56 Charge valve
57 Charge valve outlet tube
58 Compressor inlet pilot tube
59 Pilot tube to low pressure pilot
60 Compressor outlet to high pres
61 Liquid quench valve
62 Liquid quench valve remote bu
63 Liquid quench inlet tube
64 Liquid quench valve outlet tu
65 Liquid quench valve and hot g to compressor inlet refrigera

Figure 7–3—Continued.



the air conditioner; thus precluding the necessity of unbrazing and brazing the valve bodies from their associated air conditioner tubing.

7–18. Solenoid Valve

a. Discharge refrigerant system in accordance with paragraph 7–7.

b. Disassemble solenoid valve (31, fig. 7–3) in numerical sequence as illustrated in figure 7–5.

c. Reassembly solenoid valve, using new components, in reverse of numerical sequence as illustrated in figure 7–5.

d. Recharge refrigerant system in accordance with paragraph 7–8 and 7–9.

e. Check for refrigerant leakage in accordance with paragraph 7–6.

7–19. Liquid Quench Valve

a. Discharge refrigerant system in accordance with paragraph 7–7.

b. Disassemble liquid quench valve (61, fig. 7–3) in numerical sequence as illustrated in figure 7–6.

Note. Remove tape insulation and clamps, holding remote sensing bulb to refrigerant return tube (45, fig. 7–3) and remove bulb and its associated tubing with valve power head.

c. Reassemble liquid quench valve, using new components, in reverse of numerical sequence as illustrated in figure 7–6.

d. Clamp, insulate and tape remote sensing bulb to refrigerant return tube (45, fig. 7–3) and clamp remote sensing bulb tubing, using existing clamps.

e. Recharge refrigerant system in accordance with paragraphs 7–8 and 7–9.

d. Recharge refrig
ance with paragraphs

e. Check for refrig
ance with paragraph 7

7–21. Thermostatic

a. Discharge refrig
ance with paragraph 7

b. Disassemble t
valve (37, fig. 7–3)
illustrated in figure 7-

Note. Remove tape i
remote sensing bulb to e
7–3) and remove bulb with

c. Reassemble t
valve, using new co
numerical sequence
7–8.

d. Clamp, insulate
bulb to evaporator c
and clamp remote se
existing clamps.

e. Recharge refrig
ance with paragraphs

f. Check for refrig
ance with paragraph

7–22. Pressure Relie

a. Discharge refri
ance with paragraph

b. Remove pressur
7–3) and replace wit
ance with paragraph

b. Disassemble valve so that only the valve body is connected to its associated tubing.

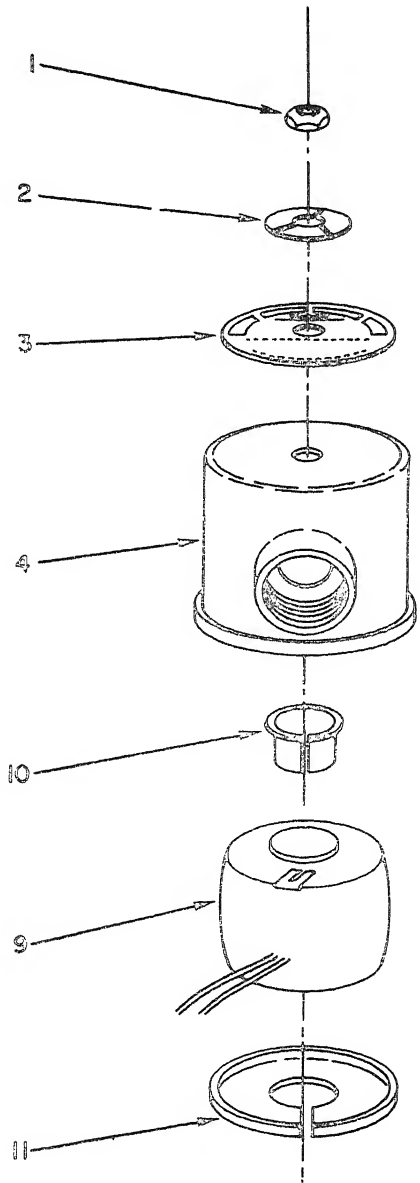
c. Unbraze valve body in accordance with paragraph 7–14*a*.

d. Install a new valve body in accordance with paragraph 7–14*b*.

e. Reassemble valve.

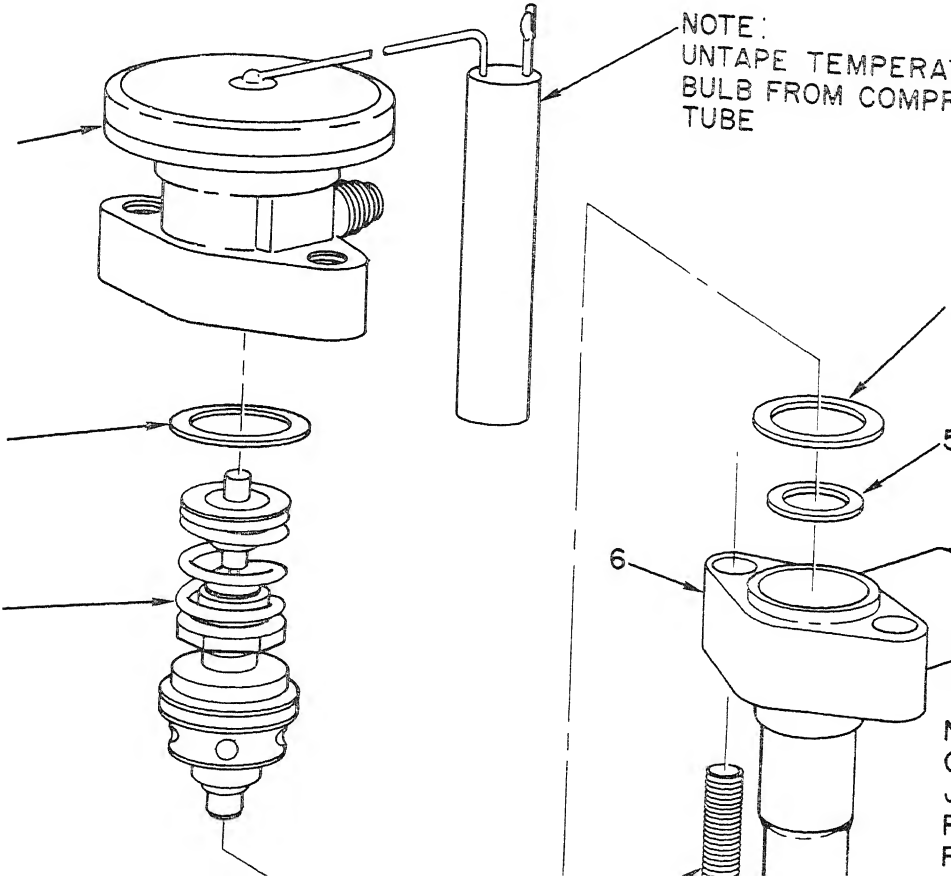
f. Charge refrigerant sys
with paragraphs 7–8 and 7–

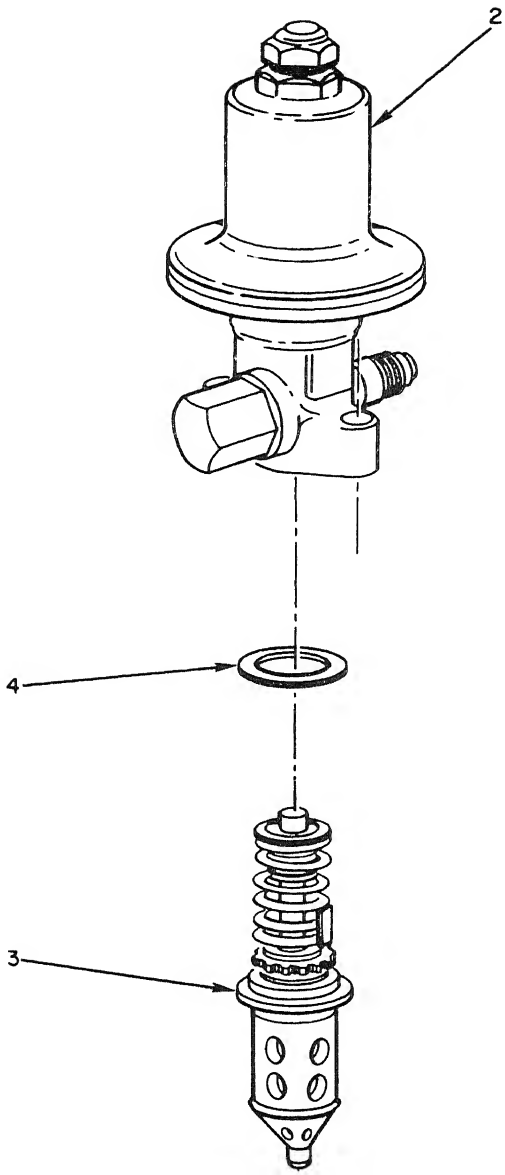
g. Check for refrigerant
ance with paragraph 7–6.

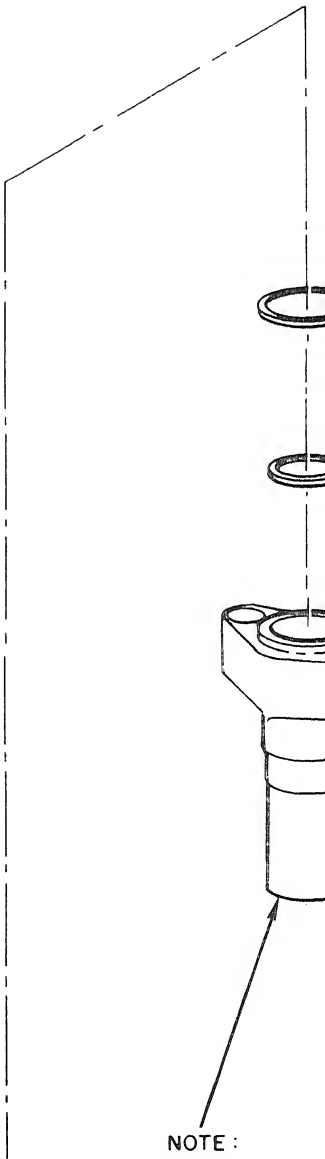

1
2
3
4
10
9
11

1 Coil housing nut
2 Coil name plate
3 Valve name plate
4 Coil housing assembly
5 Union nut
6 Enclosing tube assembly
7 Enclosing tube-to-body gask
8 Plunger and piston assembly
9 Coil assembly
10 Coil sleeve (2)
11 Coil plate
12 Body and seat assembly

Figure 7–5—Continued.

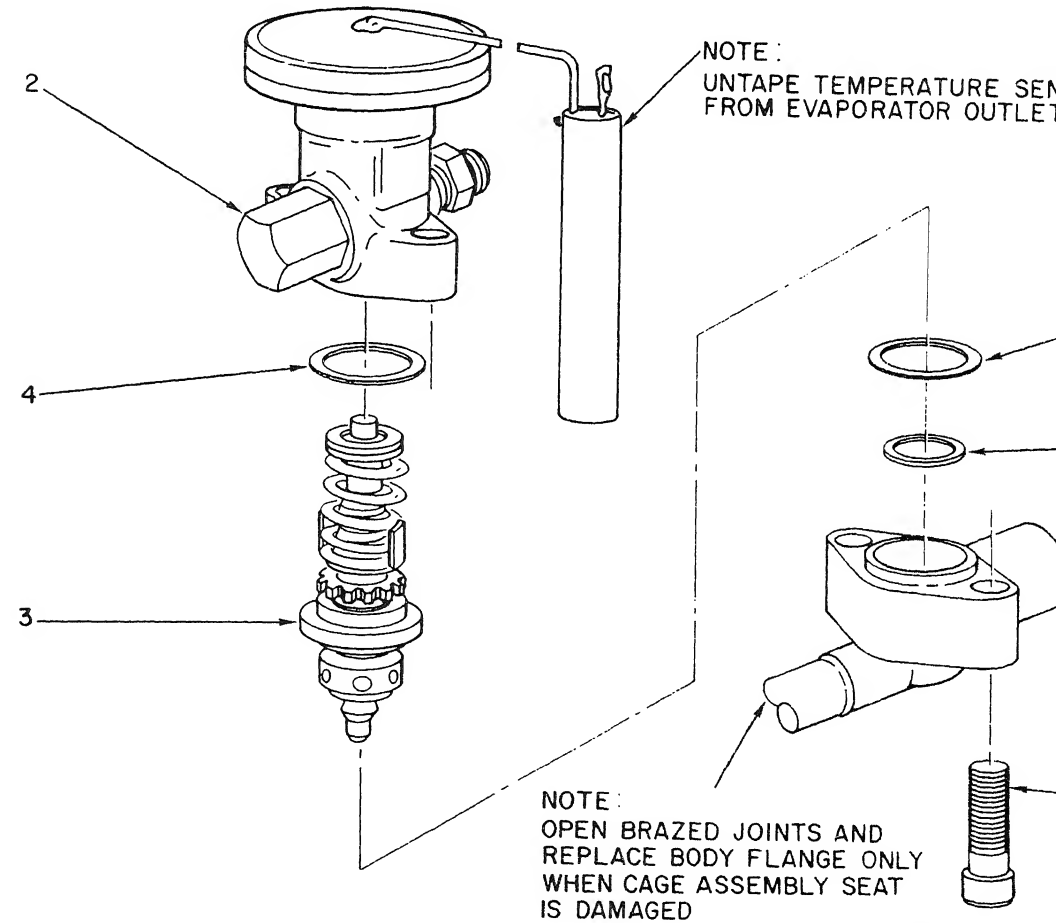



2
4
3


NOTE :

1 Body flange cap screw (2)
2 Body and case assembly
3 Cage assembly
4 Body flange gasket
5 Body flange gasket
6 Seat gasket
7 Body flange

Figure 7-7—Continued.



APPENDIX A

REFERENCES

A–1. Fire Protection

TB 5–4200–200–10	Hand Portable Fire Extinguishers For Army Users

A–2. Painting

TM 9–213	Painting Instructions for Field Use

A–3. Maintenance

TM 38–750	Army Equipment Record Procedures
TM 5–764	Electric Motor and Generator Repair
TM 5–4120–287–25P	Organizational, DS, GS, & Depot Maintenance Repai Tool List

A–4. Shipment and Storage

TB 740–93–2	Preservation of USAMEC Mechanical Equipment for age
TB 740–93–3	Administrative Storage of USAMEC Mechanical Equi

APPENDIX B

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B–1. Scope

This appendix lists items which accompany the air conditioner or are required for installation, operation, or operator's maintenance.

B–2. General

This Basic Issue Items List is divided into the following sections:

a. Basic Issue Items — Section II. A list of items which accompany the air conditioner or are required for the installation, operation, or operator's maintenance.

b. Maintenance and Operating Supplies — Section III. A listing of maintenance and operating supplies required for initial operation. (NOT APPLICABLE)

B–3. Explanation of Columns

The following provides an explanation of columns in the tabular list of basic issue items, section II.

a. Source, Maintenance, and Recoverability Codes (SMR), Column (1).

(2) Maintenance Co
lowest category of mainte
install the listed item.

Code	Expl
C	Operator/crew
O	Organizational mai

(3) Recoverability Co
er unserviceable items sho
recovery or salvage. Items
pendable.

b. Federal Stock Num
This column indicates the
ber for the item.

c. Description, Column
indicates the Federal item
ditional description of th
part number or other r
followed by the applicabl
supply code for manufactu
Repair parts quantities ir
and assemblies are shown
pair part name.

d. Unit of Issue, Colum
indicates the unit used a
e.g., ea, pr, ft, yd, etc.

or to obtain as required. As required items are indicated with an asterisk.

i. Illustration, Column (9). This column is divided as follows:

(1) *Figure Number, column (9)(a).* Indicates the figure n in which the item is sh

(2) *Item Numb* dicates the callout n the item in the illustra

Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description	(4) Unit of issue	(5) Qty inc in unit pack	(6) Qty inc in unit
PC		GROUP 31—BASIC ISSUE ITEMS MANUFACTURER INSTALLED			
		3100—BASIC ISSUE ITEMS—MANUFACTURER OR DEPOT INSTALLED			
PC	7520–559–9618	CASE MAINTENANCE AND OPERATIONAL MANUAL: Cotton duck, water repellent, mildew resistant	--	--	--
PC		DEPARTMENT OF THE ARMY OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL TM 5–4120–287–15	--	--	--
		3200—BASIC ISSUE ITEMS, TROOP INSTALLED OR AUTHORIZED			
PO	4130–860–0042	OIL, FILTER: Water soluble	--	--	--
PO	8040–273–8717	ADHESIVE: 1 pt can	--	--	--

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

C–1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

C–2. Explanation of Columns in Section II

a. Group Number, Column (1). The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750–93–1. Functional Grouping Codes) are listed on

tions for the various m
are as follows:

C — Operator or crew
O — Organizational m
F — Direct support m
H — General support
D — Depot maintenan

The maintenance funct
follows:

A—Inspect. To determin
item by comparing
ical, and electrical
established standar

B—Test. To verify servi
electrical or mech
of test equipment.

C—Service. To clean, t
to paint, and to
cooling agents, an

D—Adjust. To rectify t
to bring into pr

E—Aline. To adjust s
ments of an item
performance.

H—Replace. To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

I—Repair. To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting, and strengthening.

J—Overhaul. To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

K—Rebuild. To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Tools and Equipment, Column (4). This column is provided for referencing by code the special tools and test equipment, (sec. III) required to perform the maintenance functions (sect. II).

e. Remarks, Column (5). This column is provided for referencing by code the remarks (sect. IV) pertinent to the maintenance functions.

C–3. Explanation of C

a. Reference Code. of a number and a lett The number references ments column on the sents the specific ma item is to be used wit sentative of columns A

b. Maintenance Lev the lowest level of mai use the special tool or

c. Nomenclature. T name or identificatio equipment.

d. Tool Number. T manufacturer's code Federal Stock Number ment.

C–4. Explanation of C

a. Reference Code. of two letters separate which are references to letter references colum ter references a mainte 3, A through K.

b. Remarks. This co pertinent to the maint performed, as indicate II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair
22	BODY, CHASSIS OR HULL AND ACCESSORY ITEMS									
2210	Data Plates:									
	Plates data	O	--	--	--	--	--	--	F	
40	ELECTRIC MOTORS									
4000	Motor Assembly:									
	Motor evap fan	--	F	--	--	--	--	--	F	H
4018	Terminal Block:									
	Clamps; connectors and grommets	F	F	--	--	--	--	--	F	
	Receptacle, remote control	O	--	--	--	--	--	--	F	
42	ELECTRICAL EQUIPMENT									
4202	Electrical Controls:									
	Tray, electrical	F	F	--	--	--	--	--	F	F
	Control Box, remote	O	O	--	--	--	--	--	O	O
4203	Circuit Breakers, Fuse and Fuse Holders:									
	Fuseholder	O	--	--	--	--	--	--	O	
	Circuit breakers	F	F	--	--	--	--	--	F	
	Switches, reset & overheat	--	F	--	--	--	--	--	F	
	Relays	--	F	--	--	--	--	--	F	
4205	Control Resistances:									
	Resistor, variable	--	O	--	O	--	--	--	O	
4211	Power Receptacles:									
	Main power receptacle	F	F	--	--	--	--	--	F	
4212	Heating Units:									
	Heater elements	F	F	--	--	--	--	--	F	
4213	Non-Rotating Rectifiers:									
	Converters:									
	Rectifier	--	F	--	--	--	--	--	F	
	Power transformer	--	F	--	--	--	--	--	F	
4216	Miscellaneous Wiring and Fittings:									
	Wiring harness	F	F	--	--	--	--	--	F	
	Wiring harness remote	O	O	--	--	--	--	--	O	

(1) Group No.	(2) Functional group	(3) Maintenance functions A Inspect	B Test	C Service	D Adjust	E Aline	F Calibrate	G Install	H Replace	I Repair
5241	Evaporator:									
	Evaporator assembly	F	F	O	--	--	--	--	F	F
5243	Blower Assembly:									
	Fan assemblies	F	F	--	--	--	--	--	F	H
5244	Thermostatic Controls:									
	Thermostat	--	O	--	--	--	--	--	O	
5245	Air Filters:									
	Clip, mounting	O	--	--	--	--	--	--	--	O
	Filter	O	--	O	--	--	--	--	O	O
	Mist eliminator	F	--	F	--	--	--	--	F	F

Section III. SPECIAL TOOL AND SPECIAL TEST EQUIPM REQUIREMENTS

Reference code	Maintenance level	Nomenclature
1-J	D	Holding fixture (96193) HF26664-T-11 Torque adapter (96193) TA26664-T-10 Holding fixture (96193) HF22395-T-3 Press rod (96193) PR26664-T-4 Press tool (96193) PT26664-T-2 Holding fixture (96193) HF26664-T-1 Holding fixture (96193) HF26664-T-3 Torque adapter (96193) TA26664-T-9

Section IV. REMARKS

Reference code	Remarks
A-1	Straighten weld or patch pierced panels
B-1	Replace gasket or insulation

INDEX

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